

# Railway Age Gazette

Including the Railroad Gazette and the Railway Age

PUBLISHED EVERY FRIDAY AND DAILY EIGHT TIMES IN JUNE, BY THE  
SIMMONS-BOARDMAN PUBLISHING COMPANY,  
83 FULTON STREET, NEW YORK.

CHICAGO: 417 South Dearborn St. CLEVELAND: New England Bldg.  
LONDON: Queen Anne's Chambers, Westminster.

E. A. SIMMONS, *President.*

L. B. SHERMAN, *Vice-President.*

HENRY LEE, *Sec'y & Treas.*

The address of the company is the address of the officers.

## EDITORS.

SAMUEL O. DUNN,  
*Editor.*

BRADFORD BOARDMAN,  
*Managing Editor.*

ROY V. WRIGHT  
B. B. ADAMS

E. T. HOWSON

G. L. FOWLER

WILLIAM FORSYTH

W. E. HOOPER

H. F. LANE

H. H. SIMMONS

R. E. THAYER

F. W. KRAEGER

E. S. FAUST

S. W. DUNNING

CLARENCE DEMING

Subscriptions, including 52 regular weekly issues and special daily editions published from time to time in New York, or in places other than New York, payable in advance and postage free:

United States and Mexico.....	\$5.00
Canada .....	6.00
Foreign Countries (excepting daily editions).....	8.00
Single Copies .....	15 cents each

Engineering and Maintenance of Way Edition and the four Maintenance of Way Convention Daily issues, North America, \$1.00; foreign, \$2.00.

Entered at the Post Office at New York, N. Y., as mail matter of the second class.

VOLUME 52.

MARCH 22, 1912.

NUMBER 12.

## CONTENTS

### EDITORIAL:

Editorial Notes .....	665
Electrification of Steam Roads.....	666
Tests of Brake Shoes.....	667
High Speed and Accidents.....	668
Rural Trolleys as Steam Railway Subsidiaries.....	668
The New York Central and the Lake Shore.....	669, 703, 705
Cleveland, Cincinnati, Chicago & St. Louis.....	671, 707
Michigan Central .....	672, 709
New Books .....	673

LETTERS TO THE EDITOR.....	674
----------------------------	-----

### ILLUSTRATED:

All-Steel Box Cars .....	677
The Construction of the Oregon Trunk and Des Chutes Railways in Central Oregon .....	680
Variations in Locomotive Tractive Effort with Speed; by A. S. Williamson .....	685
Hot Water Boiler Washing and Filling Systems.....	690
The Everlasting Blow-Off Valve .....	691

### MISCELLANEOUS:

Train Accidents in February.....	689
Foreign Railway Notes .....	691

GENERAL NEWS SECTION.....	692
---------------------------	-----

IN the wreck at Warrior Ridge, Pa., February 15, emergency packets for use in first aid to the injured were greatly needed; if there had been one in each car much suffering would have been relieved. This is the testimony of a clergyman who was on the train, and who sent his observations to the Pennsylvania state railway commission. In a temperate and conservative letter, praising the trainmen, including those who were injured, for their energetic attention to the needs of the passengers, he points out this lack, and also the desirability of having an axe and a steel bar in each car. He is an extensive traveler, and also for years has attended the sick in hospitals, so his words are entitled to attention. The Warrior Ridge wreck was somewhat

peculiar, the engine, with its emergency box, being brought to a stop a long distance from the cars. Even if it had been near, a single box would not be much in the presence of fifty or sixty injured persons. Again, the occurrence of such disasters is rare. An emergency package in a passenger car would not be needed, in that car, probably, for years. Probably the best thing to do would be to make emergency packages so small that the burden, both of first cost and of care, would be small, and then distribute throughout the train, or at least in half the cars, what is now carried on the engine and the baggage car. Separation of large packages into smaller ones is an improvement which has already been made on the freight trains of the Southern Pacific. This was done primarily to obviate the necessity of disturbing the materials not used in a given emergency.

RAILWAY companies of the country held on June 30, 1910, about \$3,952,000,000 of railway securities, about one-third being bonds and two-thirds stocks. But not included in these returns is the large amount of railway securities, estimated at about \$2,750,000,000, held by the railway corporations through holding companies and practically for purpose of control the same as though held in a railway corporation's treasury. While, as the Hadley commission has pointed out, these outside holdings "have all the disadvantages of consolidation without getting its advantages," comparative figures are interesting and informative as meaning upward or downward movement toward consolidation. Such figures are indices of a process toward consolidation and in a large number of cases mean sooner or later consolidation actually carried through. The figures are suggestive. During the first half of the decade ending with the year 1910 the average annual increase in securities held by the railway companies was about \$500,000,000. During the last half of the decade the average annual increase has dropped to about \$240,000,000, or more than 50 per cent. The decrease undoubtedly represents the play of several forces, positive or negative. In the first place, there has probably been a natural exhaustion of the movement toward railway control of smaller lines which was so vigorous in the first years of the last decade and some years earlier—if for no other reason than that so many subsidiary or connecting lines had already come under the control of the larger railway systems. Another force has been the decline of the holding company as a device for control, partly as a result of the Northern Securities decision. The device exists still but not with its earlier scope, and certainly with much lessened opportunity for "high" finance. Finally, a more general but also more powerful influence has been the aggressive policy of the federal government and state commissions, which needs only to be stated to be recognized as an obstacle to purchase of stocks and bonds with control and consolidation as their ultimate purpose. The decreased tendency of the railway corporations to buy stocks and bonds for control and mergers raised two interesting questions. Will there be a new drift on the part of our bigger railways toward leaseholds and away from purchase as a means of expansion? And how far will a tendency against intercorporate holdings diminish the argument for federal charter?

THE quickest way for a person in a car of a passenger train to cause the stoppage of the train is to exhaust air pressure from the brake pipe, and for this the conductor's valve is provided. To neglect this means, and, instead, to signal the engineman to stop, interposes an appreciable delay. This is wholly unnecessary, if the men in the cars are competent to manage the conductor's valve; and in case of a danger which demands the quickest possible stop the delay may mean an aggravation of the danger; in other words, it may be important to reduce the delay as much as possible. We have long since abolished the uncertainties of the old bell-cord, but we have not done away with its slowness. With the air signal there must be an interval between the two blasts of the whistle, and

another interval to enable the engineman to assure himself that the signal does not mean something else than "stop." And with a fast train every second is precious. These considerations are illustrated in an accident which happened recently to one of the fastest trains on an eastern trunk line. The electric light dynamo under one of the cars became loose and dropped so far as to catch on the plank at a highway crossing, which resulted, after running a few hundred feet, in the dynamo being thrown out to one side and across the adjacent main track. The two trucks next back of this dynamo were badly damaged, but did not run off the track. Riding in this car was the conductor of the train, and, feeling the severe jar, he grasped the whistle cord and gave the two pulls necessary to convey to the engine a stop signal. Seeing that the engineman did not respond, he gave two more blasts; and then instructed the porter to pull the conductor's brake valve, which was done. But the disturbance caused by the accident was also heard or felt by a brakeman in the next car in the rear, and he also pulled the whistle cord twice; and these two pulls, coming between the first two and the second two given by the conductor, made six in all, and six blasts of the whistle was what the engineman received. This is the signal for increasing the supply of steam to the heating pipes, and that was what the engineman did. The whistle was blown a seventh time, however, and so the engineman, although on looking back he could see nothing wrong, concluded that something was the matter, and applied the brakes. By this action, or that of the porter, the train was stopped. From the time that the conductor first pulled the whistle cord it ran about a mile and a quarter.

#### ELECTRIFICATION OF STEAM ROADS.

THE change in the tone of the New York Railroad Club annual electrical nights during the past few years affords a most interesting and significant study. One would hardly recognize the meeting which was held last Friday evening, if he had not attended the last two or three meetings of this kind and watched the gradual change of opinion on the part of the electrical engineers. Not many years ago the steam railway officer was severely criticized and assailed because, in the minds of electrical engineers, he did not understand his business. Between their attacks upon the railroader they were busily engaged in fighting among themselves as to the best system to use. In the old days an "electrical night" was as much fun to the outsider as a good football game. A great change has come about, however, and now the electrical engineer is willing at least to concede that very few steam roads are ready for electrification and that the railway officer is perfectly justified in not rushing into it. Moreover, they seem to have awaked to the realization that there is more than one good system and that different conditions often require different methods of treatment. While there has been no great progress made in electrification during the past year as far as additional equipment is concerned, there have been some very interesting developments.

While the Friday night meeting was not as spirited as some of the previous meetings have been, a considerable amount of valuable information was brought out. The most important features were the summing up of the present situation by W. J. Harahan; the statement by W. J. Wilgus of the results that have been obtained for the first year of operation of the Pennsylvania terminal, and the remarks by W. S. Murray, of the New Haven, which showed that the improvements which had been made in the single phase system since its installation have not only increased its reliability, but have very greatly reduced the first cost of the apparatus used.

Mr. Harahan directed attention to the fact that very little progress had been made during the year toward the substitution of electricity for steam. Electrification has only been used thus far under very special conditions, such as long tunnels, proximity to water power, etc., but where it has been used it has proved to be thoroughly reliable. A number of roads

having ample credit have thoroughly investigated its use, and that they have not adopted it would seem to indicate that they do not consider it a good financial proposition. While a saving may result in the cost of operation, the amount of capital required to make the change is so great that adequate returns upon the investment cannot be guaranteed. When the substitution of electricity for steam can show a good financial return, it will be adopted, for there are progressive railway officers, and operation by electricity has certain advantages which must appeal to them.

George Gibbs, electrical engineer of the Pennsylvania Railroad, referred to the paper which he had presented at the Berne, Switzerland, meeting of the International Railway Congress in 1910, in which he had given certain data for the first two years of electrical operation on the Long Island. Figures are now available for the third year. That road now has 152 miles of main track electrified. The cost of operation per car mile for last year was 24.2 cents; the cost of power at the shoes was one cent, and there was an average of 28,000 car miles between detentions. Within the past few years the car miles have doubled, and the number of car miles per detention has tripled.

The figures for the first year's operation of the Pennsylvania terminal at New York are now available. These cover the main line from Harrison to the terminal station, which is about nine miles long. Of this 6½ miles are on the level and the rest of the line through the tunnels and its approaches has some very heavy grades. The service is largely handled by electrical locomotives. The tunnel is much drier than was anticipated and there is therefore a better factor of adhesion. The locomotives have made a total of 909,000 miles during the year, of which 650,000 miles was road service, while the remainder was for switching and transfer. The locomotives averaged 26,000 miles for the year, and the service was entirely satisfactory. The cost of repairs per mile run was 5.91 cents. This is greater than was expected and was largely due to the cost of maintenance of the brake shoes, to tire turning, and to a number of structural changes which it was necessary to make after the locomotives were placed in service. On the New Jersey division the cost of repairs to steam locomotives was 8.83 cents per mile, while for the Pennsylvania as a whole the cost was 11.91 cents per mile. The lubrication of electrical locomotives cost .25 cents per mile, or about the same as for the steam locomotives. The engine house expense for the steam locomotives amounted to .58 cents per mile, while for steam locomotives on the Pennsylvania it amounted to 2.58 cents per mile. The important savings were, therefore, in the repairs and the engine house expenses.

The electrical locomotives are given a daily inspection and after every 2,500 miles run are given a detail inspection which requires about four hours' time. When the electrical operation was first started the locomotives were given a detail inspection after every 800 miles, but this has been gradually increased to 2,500, as the reliability of these locomotives has become more evident. There were only 16 failures of electrical locomotives during the year, and for the multiple unit trains, which made about 300,000 miles, there were only three detentions.

William McClellan said that although the electrical systems had all proved reliable, they had not as yet proved a financial success. Political and other conditions are such that the railway officers would not be warranted in going to the additional expense to electrify at this time. He did not consider that the past year had been a period of stagnation; there has been considerable development in improving the details of construction and operation of the electrical systems. He had been asked how the electrical locomotives would affect the track as compared to the steam locomotive, but he frankly confessed that he could not say it would be easier on the track. This is a question which should be given considerable study. Another problem is that of the desirability of electrical locomotives for use

on heavy grades, and as to how much can be saved by using them rather than eliminating the grades by expensive construction work. The main problem, however, is that of the very great financial investment necessary in making a substitution of electricity for steam. The first cost of the installation cannot be cut down very greatly and the logical solution of the problem is to look for greater efficiency. For instance, if the roads in one district could pool together and build a large power station, it would be possible to get a very much better load factor and thereby increase the efficiency of operation. Moreover, it might be possible to combine the motor repairs and take care of the equipment jointly.

W. S. Murray, electrical engineer of the New Haven, said that for the first few years of electrical operation on the New Haven he always felt that he was on the defensive in talking about the single phase system. So satisfactory have the results been that he does not feel now that that system needs any defending at all. He gave a number of illustrations of the way in which the overhead construction had been improved and the first cost of the apparatus very greatly decreased.

E. B. Katte, of the New York Central, outlined the extensions and improvements which had been made on that road, and said that arrangements were being made to develop a new experimental locomotive and a new type of motor car. B. F. Wood, of the Pennsylvania thought that one reason why the necessity for electrification was not so strongly felt at the present time was that important improvements had been made in locomotive design, including, for instance, the application of superheat, brick arches, etc. The limit of improvement will, however, eventually be reached in the steam locomotive. He suggested that if the different electrical companies could get together on standard apparatus, it might be possible to have the cost of the new equipment financed by equipment trusts. As long as the equipment is not interchangeable, however, this can hardly be done.

#### TESTS OF BRAKE SHOES.

**A**N elaborate investigation as to the action and service of brake shoes on the surface cars of the Brooklyn Rapid Transit System, which has also been partially extended to the elevated service, has been made during the past year by George L. Fowler. While the work is mainly interesting to those who control the operation of surface electric railways engaged in a congested street traffic, many points were brought out that have a direct bearing on steam railway service. The investigation included a thorough examination of the metals of which the brake shoes were composed, both as to the chemical and physical properties. Analyses of the metal of all of the shoes were made, and tests were also made to determine the hardness and strength, and the microscope was used to examine into the structure.

In the report rendered to the railway company it was specifically recommended that no chemical requirements should be introduced into brake shoe specifications, yet it was suggested that it would be well to urge foundrymen to attempt to make their product as uniform as possible, both as to chemical composition and structure, and that the best results will be obtained if the carbon of the shoe is evenly balanced between the combined and graphitic so that half appears in either form. These are important elements if uniformity of results is to be obtained not only in braking efficiency but in the wear of the shoes, for many variations and vagaries of brake shoe performance are directly traceable to inequalities in shoe structure.

In order, too, that the shoes may give the best results, close attention should be paid to the condition of the foundation brake rigging, for unless this presses the shoe uniformly and evenly against the wheel, there will be an unevenness of wear which will greatly increase the scrap weights of discarded shoes. For example, Mr. Fowler puts the ideal scrap weight of the surface car shoes at 30 per cent. of the weight when new, and at 25 per

cent. for the heavier shoes used on the elevated cars. The surface shoes weigh about 21 lbs. when new and the elevated shoes about 45 lbs., flanged shoes being used in both cases. If the foundation rigging is in good condition and the metal of the shoes is of a uniform texture, these conditions of wear can be maintained, but if there is a tilting of the head and the scrap shoe is thicker at one end than the other, the metal so lost in scrap that should be available for wear may amount to from 10 to 20 per cent. of the whole, and therefore, will add a corresponding amount to the cost of brake shoes.

There were four types of brake shoes tested. There was a plain hard cast iron shoe; a cast iron shoe with chilled ends; one with chilled iron inserts in the tread and one with expanded metal in the body. All of the shoes were fitted with steel backs. In testing the transverse strength of the metal, it was found that there were wide variations in the four shoes. Based on transverse test pieces 1 in. square and resting on supports 12 in. apart, the breaking loads varied from about 1,880 lbs. to 3,300 lbs. It was found, however, that so long as the metal did not crumble in service the actual strength was a matter of very small moment, as the steel back will hold the shoe together and in shape even after it has been badly cracked.

Again, in the matter of hardness. Of course the harder the shoe the greater its durability and the lower its coefficient of friction. But, with the speeds obtaining in surface car work, which rarely exceed 20 miles an hour, both the coefficient of friction and the hardness are matters of apparently minor importance, because of the slight influence which they may have on the actual distance required to make a stop. The outside resistances to the movement of a car, such as rolling, journal and wind resistance, vary between such wide limits that their influence more than offsets any variations in the coefficient of friction that exist in practice. As for the hardness of the cast iron, it is very probable that satisfactory results will be obtained if the hardness is in the neighborhood of 275 of the Brinnell scale.

One of the most important points brought out by the investigation was the economic effect of the quality of the shoes. For example, it was found, in accordance with expectation, that the harder the shoe the longer its life and the lower its coefficient of friction. The longer life means a lower cost for shoes. In this the cast iron shoe with chilled ends gave the best results. But when it came to the wear of wheels the plain cast iron shoe was in the lead. If, at current rates, both wheel and shoe wear were compared, then it was a toss-up which shoe would be the best to use. But if the shoes were to be purchased at a fixed price per 1,000 car miles, then it would be possible to pay between 15 and 20 cents more per 1,000 car miles for the plain cast iron shoe than for the one with chilled ends. This is a detail that strikes at every use of shoes on steel and steel tired wheels and demands attention.

This disregard of the coefficient of friction would not be warranted on steam roads where speeds are higher and the rails cleaner than on the streets where this investigation was made. But the recommendation that a basic hardness be used as best adapted to brake shoe work is worth attention, though that hardness be different from the one suggested. So, too, the one regarding the care to be exercised in the foundry practice to secure a uniformity of texture as well as a balanced carbon content, though commercial considerations would prevent the embodiment of it in specifications. Steam roads may also well look to foundation brake rigging, that the adjustment be such as to secure an even brake shoe wear, and thus reduce the weight of scrap and, with it, the cost of shoes. And last, all railway men have long ignored the effect of different grades of shoes on wheels. If a single street railway has found it to be profitable to find out what this means and what it costs to ignore it, it stands to reason that the steam roads might well follow in its wake and find out what it means for them.

## HIGH SPEED AND ACCIDENTS.

**D**OUBTLESS most railway operating officers, when they read the letter of F. C. Rice on "Excessive Speed and Railway Accidents," which was published in the *Railway Age Gazette* of March 8, agreed with Mr. Rice's statement that excessively fast running is the cause of many accidents. It should be noted that Mr. Rice protested, not against fast schedules, but against excessive speeds. A train may run regularly on a fast schedule without ever attaining an excessive speed; and, on the other hand, it may often attain excessive speeds while operating on a slow schedule. It is fast running, and not fast schedules, that causes accidents. A train may be scheduled at an average speed of only 30 miles an hour between terminals. The station and baggage men may be slow in doing their work and may, thereby, cause the train to lie for unduly long periods at stations. To make up the time lost the engineman may run at a very high rate of speed between stations. The result is to put an excessive and unnecessary strain on both track and equipment. If for any reason it is necessary suddenly to slow up or stop, the brakes may be so set as to break a rail or cause a flat wheel which may break numerous rails. These very things do happen in many cases, and they happen on roads having no trains running on fast schedules, as well as on roads having very fast schedules.

In view of Mr. Rice's letter it is interesting to recall that when Daniel Willard was vice-president of the Burlington he put speed indicators on the locomotives of that road to remedy such conditions as have been here referred to, and that the system he adopted is still in use. A prominent railway officer remarked the other day that "if Mr. Willard had never done anything else while he was on the Burlington this provision for safety which he installed would have earned his salary for all the time he was on that road." The speed indicators are employed on practically all of the important passenger runs on both the lines east of the Missouri river and the lines west of it. The tapes showing the performance for each trip are checked regularly by the division officers, and enginemen are strictly required not to exceed maximum rates of speed prescribed. Their attention is promptly called to any excess speed which the record indicates. The records are also checked periodically at headquarters in Chicago to see how thoroughly the superintendents on the different divisions are watching speeds, the check at headquarters relating only to the maximum speeds fixed, as the Chicago office has no record of any temporary slow orders. A general order universally applied limits speed on all lines to a maximum of 50 miles an hour. A lower maximum may be fixed by the management or by the division superintendents as local conditions require.

While the use of the speed recorder has been effective in preventing excessive speeds, officers of the Burlington say that it has not made it necessary to alter the regular schedules. Whatever time is lost by preventing excessive speeds while running has been saved by curtailing the time consumed at stations. The work of agents, station baggage men and those handling express and mail is very carefully supervised, with the result that the loading and discharge of traffic has been very materially quickened.

When Mr. Willard began to install speed indicators he met with a good deal of opposition. The train employees protested against the fixing of a maximum speed and the rigorous requirement, at the same time, that trains should make their schedules. The record shows, however, that the use of speed indicators has not interfered with the regularity of running of the Burlington's trains. In fact, its officers believe that on the whole, the trains make their schedule time better now in proportion than they did before the speed indicators were adopted. They also believe that the use of the indicators has a strong tendency to increase the safety of operation.

Mr. Rice in his letter suggested that Congress might better give attention to the question of excessive speeds in the operation of trains than to some of the other questions pertaining to railway operation to which it devotes a good deal of time and con-

sideration. It would seem that the matter is one to which more attention might well be given by railway operating officers themselves. Fast transportation, other things equal, is desirable, but speed which makes for unsafety is very undesirable. There is no danger in speed of itself. Running at the rate of 60 miles an hour may be as safe on a road having good roadway, double track, heavy rails, good ballast, block signals and the best of equipment as running at the rate of 25 miles an hour on a road having poor track and equipment. Henry S. Haines, formerly president of the American Railway Association, in his book, "Railway Corporations as Public Servants," advocates public regulation fixing the standards of construction and equipment to which railways must be brought before they will be allowed to run trains in excess of certain speeds. The desirability of such regulation is very questionable; but it probably is desirable that stricter rules shall be adopted and stricter supervision exercised to prevent heavy modern trains from being run too fast, particularly on track that is not strong enough to stand the strain or on lines which are not adequately protected with signals.

## RURAL TROLLEYS AS STEAM RAILWAY SUBSIDIARIES.

**T**HE yearning of the New England farmers for the rural trolley expressed itself impressively in the Connecticut legislature of 1907. There was just about that time a considerable scandal raised in the state over the extent to which street railway stock watering had been carried—one company alone having stocks and bonds that represented some \$20,000,000 at par over and above fair replacement values. But the public outcry did not prevail in a state legislature where the farm interests had a working majority. They wanted the trolleys, no matter how financed, and a dozen or more new trolley charters or amendments to old charters were passed, in spite of the vetoes of the governor, who in each case pointed out how the charters would promote the old evil of "bonding and bonusing" the lines, that is to say, building the lines on bonds marketed by brokers at a high commission, and bonusing the stock among the promoters. The results, however, thus far have shown that the chartering of new trolley lines with "free" financing has not availed. Of cross country independent lines, since 1907, practically only two have been built in the state, and one of those has gone into a receivership. Profitable trolley territory has become so far exhausted that not even speculative privilege has sufficed to build the lines.

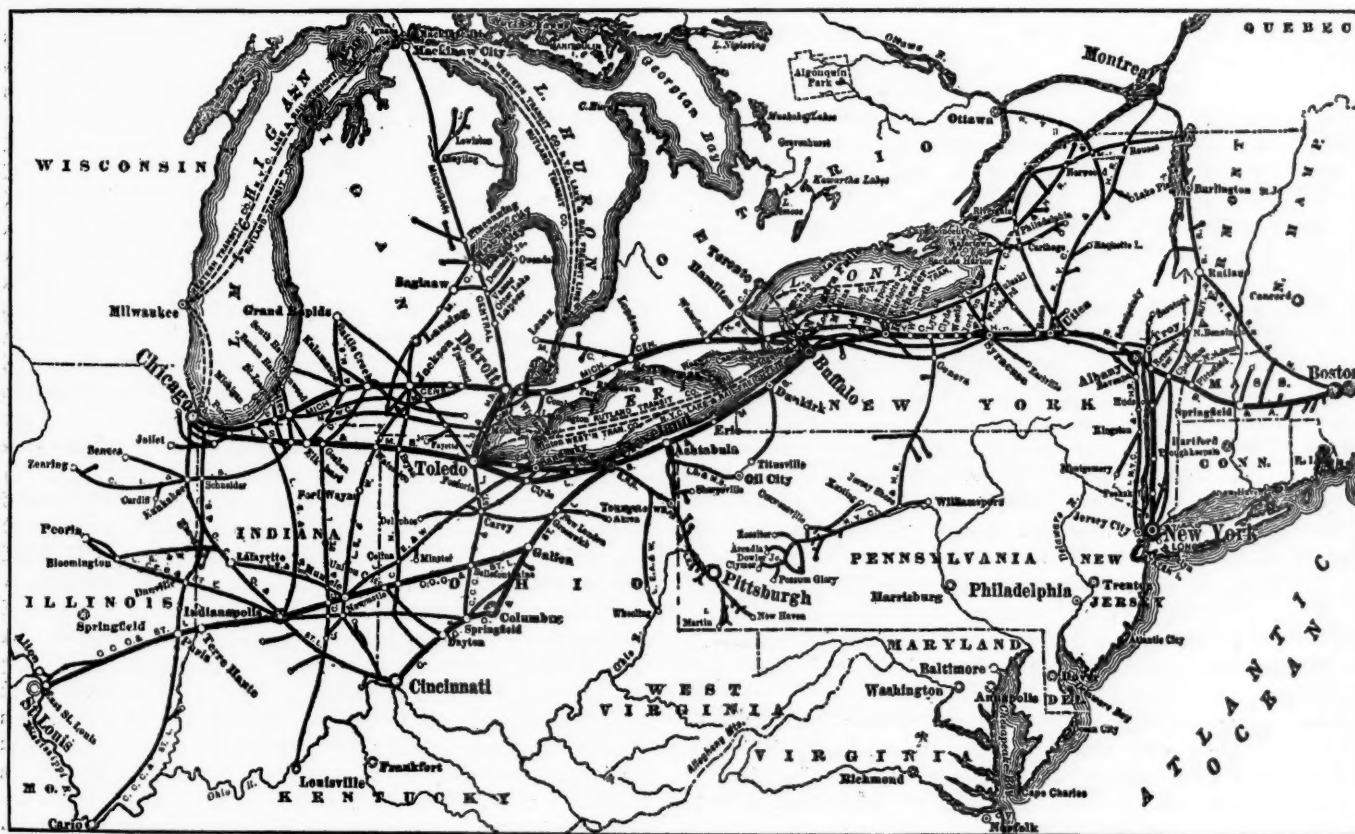
In Massachusetts the extension of the rural trolleys has, however, taken a different shape. In that state it has been illegal for the steam railway companies to take over street railway lines. The New Haven company, nevertheless, acquired some years ago about 500 miles of them, holding them through the New England Investment & Security Corporation of Boston, which the state law and state policy of separating the steam and electric properties has been unable to reach. The acquired street railway properties were in three groups—one in the Berkshire region, one centered at Springfield, and the third at Worcester. In the case of the Berkshire system, by pledging rural extensions the New Haven obtained such support in the legislature from western Massachusetts that the policy of the state has been broken and the Berkshire system, by a new act, passed to direct legal ownership and control of the steam corporation. The same proposition is now pending for central Massachusetts. Bills are before the state legislature legalizing control by the New Haven of the Springfield and Worcester street railway systems, on the promise of the steam company to spend \$5,000,000 or more in rural extensions. Naturally the measures have the strong support of members of the legislature from the interested localities, and sooner or later the Berkshire charter will almost surely be written again, the state policy reversed, the back towns get their trolleys and the steam corporation, besides direct control and administration of the trolleys, acquire certain important advantages of a financial nature from its Massachusetts street railway investment.

The legislative and civic branch of the subject is, however, less interesting than one or two of its economic phases, which apply to other regions than New England. It is admitted that private enterprise will not undertake rural trolley extensions in Massachusetts or Connecticut, and in the latter state, the history of the years since 1907 has demonstrated the fact. New England is marked by great expanses of rural territory where transportation of products is limited to the farm wagon and transportation of persons is not much better. There is such a region, for example, in central and western Rhode Island, which, as a state, exceeds any state of the Union in population per square mile. It is typical of the "back country" of New England, where population has decreased 50 per cent. in the last half century, the workers grown listless and the abandoned farm an everyday fact—yet a region once thriving with active farming and orchard culture. In such a region, where private individuals refuse to make trolley investment, with profits at best very remote, the New Haven railway authorities assert, nevertheless, that the investment by the steam corporation—with wise selec-

in the country in the summer. All these give interest to the future of the trolley as a subsidiary of a steam railway. In Massachusetts, at least, the economic proposition is soon to have its test.

#### THE NEW YORK CENTRAL AND THE LAKE SHORE.

IF the New York Central's plan for consolidating the New York Central & Hudson River and the Lake Shore & Michigan Southern had been carried out previous to the calendar year 1911, and if the consolidation had taken place without adding any fixed charges to either the Central or the Lake Shore, the combined properties would have earned in 1911 over 9 per cent. on the New York Central's outstanding \$222,730,000 stock. As it was, the New York Central earned 6.8 per cent. on its stock and paid 5 per cent., and the Lake Shore earned 28.3 per cent. on its stock and paid 18 per cent. Of course, nearly the entire dividend paid by the Lake Shore went last year to help swell the New York Central's earnings, but in the statement of what their combined properties earned such pay-



The New York Central Lines.

The map shows, in addition to the roads whose reports are reviewed in this issue, the smaller New York Central Lines, like the Lake Erie & Western.

tion of regions of natural farm resources—will pay, given moderate time for development—not because of direct returns from the trolley but from new business fed to the steam line. The old theory, not seldom fulfilled, of leasing a branch steam road not for direct but for secondary profit on a main line thus repeats itself with a new application to the rural electric railway through decadent territory. And the plan, worked out in Massachusetts as part of a scheme of legislative tactics, is, we understand, to be tried out with no such inducement in Connecticut.

The last census has shown higher average values of the New England farm, its product and its equipment. Rural free postal delivery and the telephone have come in to mitigate the solitudes of farm life. Intensive culture of field and orchard have come to the relief of outworn soils; and of the uplifting forces the high prices of farm products are not the least. An incidental factor is the growing tendency of people from the cities to live

ments by the Lake Shore are deducted from New York Central earnings before they are combined with the Lake Shore's.

The annual reports of the New York Central & Hudson River and the Lake Shore & Michigan Southern for the calendar year ended December 31, 1911, have two quite distinct features of special interest. Both companies—when compared with other roads in 1911—show unusually high net earnings; and both companies' reports reflect and throw some light on the New York Central's plans to consolidate certain of its properties so as to make a single operating organization.

As it is at present, the New York Central System, so-called, is a very indefinite term. The four principal New York Central lines are the New York Central & Hudson River, the Lake Shore & Michigan Southern, the Michigan Central and the Cleveland, Cincinnati, Chicago & St. Louis. Each one of these companies has subsidiary companies and each one of them has

various contracts or leases with some of its subsidiaries; so that only part of the mileage operated is owned by the parent company, and the intercorporate relations are necessarily very complex. The two companies that we are interested in here are the New York Central & Hudson River and the Lake Shore & Michigan Southern, which operate 3,790 miles and 1,775 miles, respectively. But, of this total mileage of 5,565 miles, there is only 1,676 miles owned by the two companies. It is too soon yet to go into any discussion of the plans of the management to consolidate, first, the lines which are leased by the separate companies and, then, the two parent companies, but it is interesting to run over briefly what has been done in the past year. The New York Central & Hudson River has received permission from the New York Public Service Commission to buy the stock of the New York & Harlem at \$175 per \$50 share; has asked permission—although it has not yet received it—to buy that part of the stock of the New York, Ontario & Western which has heretofore been held by the New York, New Haven & Hartford; and has asked permission to sell the remainder of its Rutland Railroad stock to the New Haven company. The segregation of the Boston & Albany and the arrangements made with the New Haven for joint operation of certain lines were mentioned in our comments on the annual report of the New York Central for 1910. Since the close of the calendar year, the Central has applied to the New York Public Service Commission for authority to buy the outstanding stock of the Rome, Watertown & Ogdensburg at \$128 per share and the stock of the Utica & Black River at \$180 per share.

The cost of the consolidation of the New York & Harlem can be estimated roughly, but, of course, this throws no light on what it will cost to consolidate the other lines, each consolidation being a problem with its own individual factors. The Central now pays 10 per cent. on the New York & Harlem's \$10,000,000 stock and  $3\frac{1}{2}$  per cent. on its outstanding bonds. This calls for a total payment of \$1,420,000. On the terms of the exchange offered to New York & Harlem stockholders, the Central would pay in interest charges on its own securities to replace the Harlem stock \$1,575,000, and would continue, of course, to pay the \$420,000 interest on the bonds, but would receive directly \$400,000 which the Harlem now gets as rental for its Fourth avenue street car line.

The Lake Shore & Michigan Southern during the past year received \$3,525,000 preferred stock and \$7,000,000 first mortgage bonds of the Cleveland Short Line and \$2,145,000 stock and \$2,150,000 first mortgage bonds of the Lake Erie & Pittsburgh. This was in exchange for advances made to these two construction companies, and the Lake Shore now operates over both of these roads. Control of the Lake Erie & Pittsburgh, which runs from Marcy, Ohio, to Brady's Lake Junction, 28 miles, is held equally by the Lake Shore and the Pennsylvania Company.

As to the gain in 1911 in net earnings of the Central and the Lake Shore, we find that, while both roads cut down expenses, the Central also increased its gross. The increase in gross earnings amounted to \$4,050,000, and brought the total earnings from rail operations up to \$103,950,000. It is not necessary to discount in any way this gain in gross. It is not large when expressed in percentage, but when it is taken into consideration that other roads, including the competitors of the Central, lost in gross earnings during the past year, the gain made here is a highly creditable showing. In 1911 there was 48,250,000 tons of freight carried. The average haul was 200 miles, a gain of 3 miles. The commodities which principally furnished the increase in tonnage were grain, hay, fruit and vegetables, rails, anthracite coal, and cement, brick and lime. A part of the gain in tonnage of agricultural products may be explained by better crops, but the gains in the other commodities lead one to believe that the Central was getting a larger proportion of the traffic offered than was its competitors. The Lake Shore's slight decrease in gross, amounting to \$1,060,000, mak-

ing the total for 1911 \$48,360,000, is almost entirely explained by a decrease in the tonnage of bituminous coal, coke and ores. The Lake Shore, like the Central, got a greater tonnage of grain, but not of hay or of fruit and vegetables. The Lake Shore, participating as it does in the traffic originating at Pittsburgh and at Gary, would naturally feel sharply the depression in the iron and steel trades.

As to the gain in net through a saving in expenses, both roads saved on maintenance, and the Lake Shore saved also on cost of transportation. The Central spent \$13,720,000 in 1911 for maintenance of way as against \$14,060,000 in 1910. The Lake Shore spent \$6,180,000 as against \$7,550,000 in the previous year. Maintenance of equipment cost the Central \$16,910,000 in 1911 and \$16,940,000 in 1910; and it cost the Lake Shore \$6,700,000 in 1911 and \$7,870,000 in 1910. During the year the Central laid 49,317 tons of 100-lb. rail and 27,951 tons of 80-lb. rail. In 1910 this company laid 31,116 tons of 100-lb. rail and 40,827 tons of 80-lb. rail. There were placed in track in 1911 2,073,672 ties, of which considerably more than half were treated; while in 1910 there were placed in track 2,253,401 ties, none of which were treated. Ties at distributing points cost the Central 77.3 cents on an average in 1911 and 68.4 cents in 1910. The Lake Shore's ties cost it 85 cents in 1911 and 79 cents in 1910, twice as many creosoted ties being used last year as in the previous year, although the total number of ties placed in the track was 1,221,236 in 1911, and 2,034,057 in 1910. The Lake Shore laid 9,414 tons of 100-lb. rail and 14,028 tons of 80-lb. rail in 1911, compared with 2,850 tons of 100-lb. rail and 33,103 tons of 80-lb. rail laid in 1910. While both roads, therefore, saved in maintenance expenses, the amount of material used was not much less last year than it was the year before. Some reduction was made in track forces, apparently, on the Lake Shore. The Central savings are due to a decrease in the cost of removing snow, sand and ice, amounting to \$232,000, and \$321,000 in the maintaining of signals and interlocking plants. President Brown mentions this saving in expenses for signals as due largely to the more economical operation of the modern designs which have been installed in recent years.

The reduction of expenses for conducting transportation made by the Lake Shore are notable, because they were made in the face of increases in trainmen's wages. A reduction of \$1,198,000 in transportation costs last year, as compared with the year before, when traffic was only slightly smaller, can be explained in only one way—distinctly better and more efficient operation. The average train load on the Lake Shore has in the past been heavy, and last year it was increased from 594 tons of revenue freight to 635 tons. This was done by running longer trains. Car loading was almost exactly the same in the two years—21 tons per loaded car mile. There were, on an average, 46 cars per freight train in 1911, as against 42 cars in 1910. The increased number of cars was evenly divided as between empty and loaded, making, of course, the proportionate increase in empty mileage greater than that of loaded mileage.

The Central raised its average revenue train load from 417 tons in 1910 to 430 tons in 1911, with very slightly better car loading—19.35 tons in 1911 and 19.22 tons in 1910. The average number of freight cars per train was 38.70 in 1911 and 36.83 in 1910, the longer trains being due largely to an increase in empty car mileage.

The Central got in 1911 an average ton mile rate of 6.33 mills, and got only slightly less in 1910. The Lake Shore got 5.32 mills in 1911 and 5.23 mills in 1910. Both the New York Central & Hudson River, and the Lake Shore & Michigan Southern have heavy freight density. The Central's is 2,560,000 tons of freight carried one mile per mile of road, and the Lake Shore's 3,510,000 tons carried one mile per mile of road. Such a freight density as this handled along with a heavy passenger business makes the problem of getting trains through on time a serious one. On the Lake Shore the easy grades and fine roadbed make this possible. The New York Central has the two West

Shore tracks which it uses for freight as far as possible, and in addition it has in the main four tracks on the east shore of the Hudson, but this four-track system is not complete. There are places where there are only three tracks, or even only two tracks. The company is now at work on a very extensive plan of putting additional tracks in such places, the work being exceedingly difficult and very expensive.

The work of building the new Grand Central terminal can only be mentioned here. It has been frequently referred to and commented on in the *Railway Age Gazette* during the past year. President Brown says that the waiting rooms, ticket offices and concourse will be open to the public by the end of 1912.

During the past year the New York Central Lines, including the N. Y. C. & H. R., the L. S. & M. S., the M. C., and the C. C. C. & St. L., and, subsequently, the C. I. & S., made an equipment trust agreement under which \$15,000,000 equipment trust  $4\frac{1}{2}$  per cent. certificates were issued to pay for 90 per cent. of the total cost of equipment to be furnished. The equipment to be assigned to the N. Y. C. & H. R. cost \$7,950,000, and that to be assigned to the Lake Shore \$3,305,000. An agreement has been made by the New York Central lines, including the Pittsburgh & Lake Erie and some others not mentioned above, with the Pullman company, by which that company is to furnish all-steel cars to replace as rapidly as possible the wooden cars now operated on these lines. The delivery of the steel cars is to be at the rate of about 30 cars a month, and by the end of July, 1912, all the sleeping cars on the New York Central lines will be steel cars.

Both the Lake Shore and the New York Central are in a strong cash position. The Central had at the end of 1911 \$10,710,000 cash, with only \$1,390,000 loans and bills payable; while the Lake Shore had \$12,060,000, with \$13,010,000 loans and bills payable, of which, however, \$11,540,000 are one-year notes which were issued in francs and sold in France, and which were due March 4 of this year and were extended, it is understood, in England and in France for another year.

The following table shows the principal figures for operation of the two roads in 1911 compared with the figures for 1910:

	New York Central & H. R.		Lake Shore & Michigan Southern.	
	1911.	1910.	1911.	1910.
Average mileage operated	3,790	3,785	1,775	1,663
Freight revenue	\$61,133,310	\$58,411,234	\$31,101,335	\$32,646,536
Passenger revenue	31,759,238	30,992,856	11,350,096	11,130,125
Total operating revenue	103,954,863	99,908,478	48,360,997	49,420,211
Maint. of way and structures	13,723,709	14,060,178	6,178,623	7,549,661
Maint. of equipment	16,911,146	16,936,253	6,704,096	7,873,217
Traffic	2,180,206	2,487,228	1,026,317	1,153,165
Transportation	38,935,031	37,938,527	16,245,052	17,442,858
Total operating expenses	74,472,578	74,079,087	31,078,578	34,920,933
Taxes	5,447,759	4,697,826	1,673,940	1,720,182
Operating income	24,356,001	21,012,787	15,577,403	12,729,380
Gross corporate income	40,592,181	36,459,120	25,801,618	23,181,467
Net corporate income	15,304,449	14,288,672	14,173,335	13,787,035
Dividends	11,136,465	13,363,758	8,903,970	8,903,970
Appropriations for additions and betterments	.....	924,914	.....	.....
Appropriations for replacement value of buildings at Grand Central terminal	2,500,000	.....	.....	.....
Surplus	1,667,984	None	5,269,365	*3,517,768

\*After the appropriation of \$1,365,297 installment on 1907 and 1910 equipment trusts.

#### CLEVELAND, CINCINNATI, CHICAGO & ST. LOUIS.

THE income account of the Cleveland, Cincinnati, Chicago & St. Louis for the calendar year ended December 31, 1911, does not justify the passing of the 2 per cent. dividends on the common stock, but the profit and loss account does. Net corporate income after the payment of all fixed charges was \$1,800,000 in 1911 and \$1,480,000 in 1910. Preferred dividends call for \$500,000 and 2 per cent. on the common stock calls for \$941,000 additional, so that in 1910 there was a surplus of \$34,000. In 1911 the preferred dividend only was paid, so that there was a surplus of \$1,300,000. This was credited to profit and loss, but during the year there was deducted from profit and loss \$971,000 discount on debenture bonds of 1910 and 1911,

\$94,000 discount on general mortgage bonds, \$154,000 old Central Indiana advances and \$106,000 adjustment of sundry accounts, so that against a credit of \$1,301,000 there was a debit of \$1,325,000.

The Big Four corresponds geographically to the Northwest system of the Pennsylvania Lines West, but it is the weakest financially of the four New York Central lines whose reports are commented on in this issue of the *Railway Age Gazette*. A glance at the map will show that physically the property is a network of lines rather than one or more trunk lines with feeders, like most large American railways.

In 1911 total operating revenues amounted to \$30,430,000, which is a few thousand dollars more than total operating revenue in 1910. In the operation of the property, however, the management was able to save \$1,260,000, bringing the total operating expenses down to \$22,240,000 for 1911. The volume of business handled in 1911 was about the same as that handled in 1910. There was a somewhat greater ton mileage handled, making the total in 1911 3,625,000,000 tons; and there was a somewhat smaller passenger mileage handled, making the total in 1911 429,000,000 miles. To handle at so much less a cost the same business last year that was handled the year before, the company had to practice the strictest economy, and it is worthy of especial attention that this economy was successful, not only in maintenance departments, but in transportation as well.

In maintenance less material was used than in the previous year, and the payrolls were cut by \$279,000. This is for way and structures. For equipment there was a reduction in payrolls of \$157,000 from the preceding year. The cost of repairs to locomotives, passenger cars and freight cars were all cut to a very considerable extent. In the transportation department, although the rate of pay was increased, and caused an increase of \$296,000, the force was cut down sufficiently to save \$403,000, making a net saving of \$107,000. Fuel for locomotives cost \$268,000 less in 1911 than in 1910. This was due partly to a reduction in the cost of fuel from \$1.54 to \$1.45, and partly to a decreased consumption.

Handling nearly the same amount of business in 1911 as in 1910, total revenue locomotive mileage was cut down from \$23,858,000 to \$22,405,000, with a proportionate reduction in train mileage. Car mileage increased, due entirely to an increase of 17,000,000 empty car miles, bringing the total empty car mileage up to 90,043,000 miles, compared with 287,844,000 total car miles. The average revenue train load in 1911 was 445 tons, an increase of 14 tons over the average revenue train load in 1910. This larger train load was attained by the Big Four, as it was by the Lake Shore and the New York Central, by making up longer trains. Car loading was almost the same as in 1910, namely, 19 tons per loaded car. There were, however, on an average a little over 35 cars per train last year, as against 32 cars per train the year before.

The balance sheet at the end of 1911 shows cash on hand of \$2,789,000, with loans and bills payable totaling \$3,000,000. At the end of 1910 there was \$2,866,000 cash and no loans or bills payable. During the year the company sold \$5,000,000  $4\frac{1}{2}$  per cent. debentures to pay for floating debt which presumably accrued during the first part of 1911, since there was none shown on the balance sheet at the end of 1910, and for construction and improvements. There was spent during the year \$3,690,000 for additions and betterments, all of which was charged to capital account. The discount on 1910 and 1911 debentures mentioned in the profit and loss account for 1911 was \$972,000. The debentures sold in 1910 were issued in francs and had a face value of 50,000,000 francs. In the 1910 profit and loss account there was \$70,000 shown as expenses for floating this issue, and the balance sheet showed unextinguished discount on securities of \$825,000. Presumably, then, the discount on the \$5,000,000 debentures sold last year amounted to only \$147,000.

The two principal pieces of work that the C. C. C. & St. L.

has had under way are the building of the Evansville, Mt. Carmel & Northern, and the building of the Saline Valley Railway. The Evansville road, which runs from Mt. Carmel, Ill., to Evansville, Ind., and gets trackage rights into Evansville over the Louisville & Nashville, was completed in July, 1911, at a cost of \$2,193,000. The Saline Valley is to run from Harrisburg, Ill., to the C. C. C. & St. L. coal properties in the eastern part of Williamson county, about 12 miles. At the end of 1911 there were 2 miles in operation.

The following table shows the principal figures for operation in 1911 as compared with 1910:

	1911.	1910.
Average mileage operated .....	2,012	1,982
Freight revenue .....	\$19,933,296	\$19,922,901
Passenger revenue .....	7,819,255	7,812,012
Total operating revenue .....	30,431,915	30,423,005
Maint. of way and structures .....	3,370,476	3,934,281
Maint. of equipment .....	4,972,330	5,177,765
Traffic .....	912,751	998,697
Transportation .....	12,293,691	12,724,100
Total operating expenses .....	22,239,392	23,495,620
Taxes .....	1,062,512	949,548
Operating income .....	7,083,924	5,879,655
Gross corporate income .....	7,791,655	6,700,469
Net corporate income .....	1,801,616	1,475,497
Dividends .....	500,000	1,441,126
Surplus .....	1,301,616	34,371

#### MICHIGAN CENTRAL.

It is often difficult to trace directly the savings made by any extensive improvement to a railway property. This is well illustrated in the case of the Michigan Central's Detroit river tunnel. Early in the calendar year 1911 the tunnel and approaches were completed, and the tubes were in operation for both freight and passengers for almost the entire calendar year. The tunnel was built and is operated by a separate company which issued \$3,000,000 stock to the Michigan Central and which has authorized \$30,000,000 4½ per cent. bonds guaranteed by the Michigan Central. Of these bonds \$16,000,000 have been sold. In 1911 the tunnel company earned its operating expenses and interest on its outstanding bonds, paid 2 per cent. on its stock and had a surplus of \$160,000.

The Michigan Central pays the tunnel company for the use of its property on a toll basis. In operating expenses the Michigan Central saved \$111,000 in the cost of operating floating equipment; that is, the car ferries at Detroit. It received \$60,000 in dividends on its tunnel company stock, and the \$160,000 surplus of the tunnel company virtually belongs to the M. C., so that there was here a total saving of \$331,000. On the other hand, the Michigan Central paid the tunnel company a little over \$1,000,000 in rentals. This is an example of an improvement which makes for better service, and which can be justified conclusively from an operating standpoint; yet which on its face is not justified, at least in the first year of its operation, from a standpoint purely of increased earning or decreased cost. The tunnel itself and its construction and operation have been described in the *Railway Age Gazette* previously.

The balance sheet of the Michigan Central for December 31, 1911, explains the financial operations in connection with the tunnel. At the end of 1910 the assets side of the balance sheet showed \$7,890,000 deferred debit which represented advances to the Detroit River Tunnel Company. The liabilities side of the balance sheet showed loans and bills payable of \$18,120,000. Presumably after the sale of the \$16,000,000 tunnel bonds the tunnel company paid back the advances made to it by the M. C., as at the end of 1911 there is no deferred debit item representing such advances, and the Michigan Central's loans and bills payable were reduced to \$4,500,000. Cash on hand at the end of the two years was about the same, \$3,310,000 at the end of 1911.

In 1911 the Michigan Central handled 18,730,000 tons of revenue freight, hauling each ton, on an average, 163 miles. This compares with 18,380,000 tons handled in 1910, with an average haul per ton of 167 miles. The ton mileage, therefore, of revenue freight was slightly less in 1911 than in 1910. On the other hand, the number of passengers carried in 1911 amounted

to 5,940,000, and the average distance each passenger was carried was 65 miles. The number of passengers carried in 1911 was greater by 140,000 than in 1910, and, since the average distance each passenger was carried remained almost exactly the same, the passengers carried one mile showed a slight increase.

The Michigan Central gets a low ton-mile rate and only a fair passenger mile rate. The revenue per ton per mile in 1911 was 6.42 mills, and in 1910 6.29 mills, while the revenue per passenger per mile was 1.983 cents in both 1911 and 1910. With the slightly higher ton mile rate, the freight revenue amounted to \$19,540,000 in 1911, an increase of \$260,000 over 1910; and with the larger passenger business passenger revenues amounted to \$7,600,000 in 1911, an increase of \$200,000 over 1910. There was, therefore, an increase in total operating revenues amounting to about half a million dollars. There was a saving in expenses of \$880,000, and, surprising as it may seem, a slight decrease in taxes; so that net operating income totaled \$8,100,000 in 1911, an increase of \$1,450,000 over 1910. The increase in rentals of leased lines of over a million dollars, which has previously been mentioned, was partly offset by a \$420,000 decrease in the cost of hire of equipment. Dividends of 6 per cent. were paid both in 1911 and 1910, and the company finished the year with \$990,000 surplus, as against \$590,000 surplus in 1910.

If the saving made in operating expenses had been made in the cost of conducting transportation, we might well say that this was in part and indirectly due to the operation of the Detroit tunnel. In 1911 transportation expenses totaled \$12,050,000, or about \$25,000 more than in 1910. Mr. Brown says that this failure to save more in transportation expenses is due largely to increased train mileage, cost of fuel and increased pay of train and engine crews.

There was a decrease of 1,310,000 miles in the total locomotive mileage and a decrease of 480,000 miles in the total train mileage. The average cost of fuel per ton was \$2.08 in 1911, and \$2.03 in 1910, but the cost of fuel per locomotive mile run was 13.67 cents in 1911, and 12.51 cents in 1910. Road enginemen received \$1,335,000, or \$82,000 more than in 1910.

The saving that took place in expenses was in both maintenance of way and maintenance of equipment. The decrease of \$490,000 in the cost of maintenance of way and structures was due principally, the president says, to a reduction in outlay for stone ballasting, fencing, replacement of bridges, etc., and to the fact that there was less snow and ice to contend with. There was a considerable reduction made in maintenance of way forces. The decrease of \$320,000 in the cost of maintenance of equipment was due to reduced charges for repairs.

The winter of 1910-11 was a comparatively mild one, and it is not surprising that the Michigan Central was able to keep its property up to standard at lowered cost, but the present winter has been an unusually severe one; especially since the first of January. Whether or not the reduction in track forces last year has anything to do with the condition of the property at present it is difficult to say; but the Michigan Central, like other roads in Michigan, has found it quite impossible to keep its track in really good condition during the past few months.

During 1910 the company did not add to its rolling stock. The total capacity of freight cars at the end of 1911 was 858,000 tons as against 869,000 tons at the end of 1910. There were in service 559 locomotives at the end of 1911 as against 565 at the end of 1910. During 1911, however, the company entered into the New York Central Lines equipment trust agreement, mentioned in our comments on the other New York Central lines, and the company will receive during the present calendar year equipment valued at \$2,528,000.

In 1911 the Michigan Central spent for additions and betterments to its property \$720,000, of which \$177,000 was spent on the Michigan Central main line and \$544,000 on leased and proprietary lines.

The following table compares the principal figures for operation in 1911 and 1910:

	1911.	1910.
Average mileage operated .....	1,817	1,803
Freight revenue .....	\$19,538,684	\$19,282,288
Passenger revenue .....	7,607,052	7,404,476
Total operating revenue .....	30,164,490	29,694,816
Maint. of way and structures...	3,549,205	4,035,261
Maint. of equipment .....	3,800,772	4,124,366
Traffic .....	783,599	882,151
Transportation .....	12,049,103	12,023,589
Total operating expenses.....	20,746,231	21,628,906
Taxes .....	1,322,621	1,357,020
Operating income .....	8,104,547	6,652,574
Gross corporate income.....	9,275,504	7,746,254
Net corporate income .....	2,116,364	1,717,331
Dividends .....	1,124,280	1,124,280
Surplus .....	992,084	593,051

#### NEW BOOKS.

*Efficiency as a Basis for Operation and Wages.* By Harrington Emerson. Third edition revised and enlarged. 254 pages. 5 in. x 7½ in. Cloth. Published by the *Engineering Magazine*, 140 Nassau street, New York. Price, \$2.00.

A series of articles by Harrington Emerson, which in a general way demonstrated and explained his development of the efficiency system, appeared in the *Engineering Magazine* from July, 1908, to March, 1909. It was soon discovered that it would be necessary to incorporate them into book form in order to supply the demands, and in 1909 the first edition of this work was published. It has very quickly gone through two editions, and it was decided before bringing out this, the third edition, that it would be advisable to make a thorough revision of the text in view of the knowledge and experience gained during the past two years. This has been done, and in addition to more clearly illustrating certain points and adding sections, points of connection between this volume and the one shortly to follow on the twelve principles of efficiency have been established. The book inclines more to the declaration of philosophy than to direct instruction in methods.

*Forney's Catechism of the Locomotive.* Third Edition, Revised and Enlarged. Part I. By George L. Fowler, associate editor *Railway Age Gazette*. 6 in. x 9 in.; 644 pages; 475 illustrations. Bound in cloth. Published by the Simmons-Boardman Publishing Company. Distributed by the McGraw-Hill Book Company, 239 W. 39th street, New York. Price, \$3.00.

The Catechism of the Locomotive, by M. N. Forney, was probably the best known and most widely studied book on the subject that has ever been published. It owed its great popularity to three things; the thoroughness with which the mechanism of the locomotive was described, the simplicity of the language used and the absence of mathematical formulae. These features made it easily understood by men who had not been trained to study and with whom reading was more or less of an effort. It was put in catechism form in the first place, because, as the author stated in the preface to the first edition, a question, "presents first a distinct image of the subject to be considered," and "the explanation which follows is much more apt to be understood than it would be if no such question had been asked."

The first edition was issued in 1873. It was afterwards revised by Mr. Forney, and the second edition was published in 1889. Since that time the methods of locomotive design, construction and operation have been revolutionized and a third revised edition became necessary in order that the book might adequately describe the locomotive of today.

In the second edition Mr. Forney introduced certain elementary theoretical studies of the locomotive and the methods used in developing the design. The preparation of the third edition of the book was intrusted to George L. Fowler, who for many years had been an intimate friend of Mr. Forney and who had been asked by the latter to undertake the work.

The growth of the locomotive in size and the complexity of its details during the past twenty years necessitated the introduction of a great deal of new matter, and the discarding of a little that was old. The years intervening between the ap-

pearance of the second and this third edition, have witnessed the rise and partial decadence of the compound locomotive; the birth of the Mallet; the introduction of the superheater; the development of the Atlantic and allied types where the wide firebox is carried by a trailing truck, the use of oil as a fuel; the application of the Walschaert valve gear to American locomotives; the rise of the stoker and the improvements of the air brake, as well as the growth of innumerable details that go for efficiency, to which must be added the great increase in the size and weight of the locomotives of today, as compared with those of two decades ago.

Each of these themes is treated fully, clearly and concisely in the first part of the book under review. But in preparing this matter, it was found "that, with the growth and development of the locomotive during the past two decades, more has been added than taken away, and that the requirements as to space are much greater than they were in 1889. It was, therefore, decided to break the book into two volumes or parts, making each complete in itself. The first part is devoted to the practical construction and operation of the locomotive, with such slight theoretical discussion of the matter as to make it intelligible to men who have not had the advantage of a technical training. The second part will discuss the same points more theoretically."

In the first part, then, we have the presentation of the practical details of locomotive work. There are a few introductory chapters dealing with the elemental laws of force and motion, the steam engine and the expansive action of steam. After this follows descriptions and tables of the various types of locomotives in use; the various details, such as throttle, cylinders, the machinery, and the Stephenson and the Walschaert valve gears. The valve gears are clearly explained, and at some length, so that their action can be fully understood. The various kinds of compound locomotives; the several types of superheaters and the three stokers upon the market are fully described and their operation explained. Other details, such as the spring suspension, the running gear, tenders, tanks, lubricators and miscellaneous parts receive their full need of attention. A chapter preceding that on mechanical stokers is devoted to the general subject of combustion, where, without entering into too minute detail as to theory, the reader is given a clear-cut idea of how combustion takes place and the method to be pursued in order to obtain the best results on a locomotive. A special chapter is devoted to the air brake with instructions as to its construction, care and manipulation.

There are 742 questions with their answers in this Part I, and it closes with chapters on the care and inspection of the locomotive, the handling of the machine on the road, the avoidance of accidents and first aid to the injured; and finally a very complete index by which a direct reference may be obtained to any topic in the book. Throughout the text is a profusion of illustrations, to which are added six folding plates of steam engines, valve gears, locomotives and air brakes.

In the whole treatment the author has adhered closely and faithfully to the ideals of technical presentation as conceived by Mr. Forney. The language is simple, concise and readable. Mathematical demonstrations have been avoided and the book has been kept to its old ideals. As it stands it is undoubtedly, the most complete presentation of the subject that has appeared, and is a presentation in such a form that no locomotive engineer or fireman, regardless of how scanty may have been his early advantages, can fail to grasp the full meaning of what is there offered; so that it will be sure of a hearty reception by these men to whom it is especially addressed and who will be profited by a study of its contents. It is, now, forty years since work on the first edition was undertaken, and, it is certain that, by this revision, its life and usefulness will be indefinitely extended.

Part II is on the press, and its appearance is promised for an early date.

## Letters to the Editor.

### INCONSISTENCY IN SIGNAL LIGHTS.

ERWAL, Ark., March 4, 1912.

TO THE EDITOR OF THE RAILWAY AGE GAZETTE:

Although of a rather late date to write on a point printed in your issue of January 26, the communication from D. A. G., who I note is a superintendent, seems to exaggerate the dangers of the present practice of using green for classification signal lights to denote a following section, and to recommend a change to yellow from a theoretical rather than a practical standpoint.

As stated by you, the New York Central is satisfactorily using yellow for the front and side lights of tail-end markers. The change from green to yellow for classification lights to indicate a following section has not been made by that road. The use of green for classification lights while apparently inconsistent and inadvisable, is, from a practical standpoint, the best light that may be used for the purpose. Red has been given up because that light is reserved for the rear end of trains, confusion having resulted from enginemen being unable to distinguish with reasonable quickness and certainty whether a given red light ahead was a flag, a rear end, or a classification light on an engine running in the opposite direction.

White classification lights are used to designate an extra train and are not available to indicate that there is a following section.

Yellow lights, while theoretically desirable, differ so slightly in shade from the brighter and more powerful headlight, that it is practically impossible to distinguish with a reasonable degree of certainty whether the light is yellow or white. This being the case, and a trial under actual working conditions will readily show that it is so, it is not advisable merely for the sake of consistency in practice to change from the present standard.

Green being the only other color available and being satisfactory from the standpoint of distinctness in shade and brightness of light, still seems to be the best color to use. The use of green classification lights in combination with a headlight is not in practice objectionable and has not resulted in enginemen confusing these lights with green fixed signal lights.

W. H. E.

### ATTITUDE OF PUBLIC AUTHORITIES TOWARD REGULATION OF OPERATION.

CHICAGO, March 13, 1912.

TO THE EDITOR OF THE RAILWAY AGE GAZETTE:

Referring to Mr. Rice's letter in your issue of March 8, on "Excessive Speed and Railway Accidents": Without in any way controverting Mr. Rice's view as to the extent to which high speeds contribute to train accidents, it is only proper to point out that Congress has already conferred the fullest power of investigation of accidents and their causes upon the Interstate Commerce Commission, and that that body is in position to undertake the very kind of investigation which Mr. Rice suggests should be made by a congressional committee. It is very doubtful whether the facts developed by an investigation by such a committee would be nearly as valuable as those which the commission is now in position to obtain. It does not seem to be fair criticism to say that Congress has been "making laws to compel the railways to adopt devices of which the most that can be said is that they are still in the experimental stage," etc. Congress has not forced upon the railways one single device of any sort or description which is in an experimental stage. When bills have been proposed looking to the adoption of such devices the railways have had the opportunity to present the facts, and these facts have received adequate consideration, and that no such laws have been passed is doubtless due to this.

In regard to Mr. Rice's suggestion that the bills now in the hands of committees of Congress, requiring various installations, be held up until the necessity for them can be investigated and

their practicability established: It is perfectly safe to say that none of these bills will become laws without every opportunity being given the railways to show what the facts are; this has heretofore been the practice of these committees. In addition to this, any railway or railway man, formally or informally, may take up any of the questions involved with any member of any congressional committee, and be thanked for it.

It is known that the Interstate Commerce Commission will welcome every particle of co-operation it can obtain from railway men in every branch of the service; that that commission is willing and anxious to hear from anyone who will take enough interest in any subject to go to see the commission about it. It is perfectly well known that one of the most serious complaints made by those in authority in Washington has been that the railways have failed to give information and to bring their facts to the attention of administrative bodies and congressional committees in the past; that to obviate this complaint a special committee was formed by the railways to perform this duty, among others; that this committee is being called upon constantly to do this very thing, and is doing it with a measure of success. One of the results of this is that no one in Washington at the present time holds that the railways occupy an attitude of obstruction in relation to operating matters.

Certainly, no committee or commission appointed by Congress can have broader power for investigation than the Interstate Commerce Commission now holds, and in dealing with operating matters that commission is receiving "the co-operation and conscientious support of the railways" through proper channels.

NUTLOCK.

### SOME INTERESTING SIDE LIGHTS ON RAILWAY ECONOMY.

CHICAGO, Ill., March 13, 1912.

TO THE EDITOR OF THE RAILWAY AGE GAZETTE:

Your recent articles on railway economy, by different writers of note, surely cannot be taken seriously. No doubt the extravagant manner in which lead pencils are devoured by the pencil sharpener can be greatly curtailed and thus make an unappreciable saving; but would it not be well for one of those who have the power to stop extravagances and are honestly interested in the subject of economy to go incognito into almost any big yard during the busy hours and note the damage done in the rough handling of cars?

I have been told that the average cost of repairing a drawhead is \$9.00; the cost of the damage to freight done in damaging the drawbar is not stated. It is a common sight to see the end of a new box car bulging out, because the load is shifted, especially if it is loaded with bulk goods—lumber, coal, ice, etc. Refrigerator cars are not exempt and from no other cause than unnecessary rough handling, which could be entirely eliminated if those in charge had the temerity to locate the cause and administer the cure.

A minimum saving of 10 per cent. in full can be accomplished by any railway in the United States, by stopping the overloading of tenders at coaling stations and denying itself the services of any man who shovels off coal between engine and tender.

Piston and cylinder packing, valves and valve stem blowing is a most prolific way to increase the fuel bill, and as an engine properly lubricated, as experience has demonstrated, will develop 200 more horsepower than one saving oil, no doubt in the long run it will be satisfactorily proven that a gill of oil, is cheaper than a ton of coal.

The handling of a dead engine receives not as much attention as that of an empty coal car. It is well known that the reciprocating parts of a disconnected engine are not balanced. Subsequent events in one case where an engine was placed in a train of dead freight proved this train to be the "livest" thing on the system, for where the grade permitted, a constant speed of a mile to a mile and a quarter a minute was maintained for nine consecutive miles. On another occasion, fifty-three miles were

covered in one hour and eleven minutes by a train containing a disconnected engine. Neither of these cases is of an exceptional character. After a dead engine attains a speed of twenty-two to twenty-eight miles per hour, she assumes a vertical movement, akin to that of the "hammer blow" and if it does not on this trip actually break a rail, it lays the foundation so that one soon will be broken and no doubt the section foreman wonders why his track should get out of line over night. An actual occurrence: eighteen broken rails in eleven miles were reported one cold morning, all into lengths of about 17 feet. The blame was placed on a sleeper with flat wheels; but a dead engine with 63 in. drivers also passed over this district and was never suspected of this crime. Thus another guilty man escaped and thus the daily papers start a tirade against the rail manufacturers for dishonest work and poor material. Furthermore, dead freight trains, when not making spectacular runs, burning fuel unnecessarily, are generally found on side tracks packing or setting out "hot boxes."

Without drawing pictures, or going into details, if a few of these abuses were modified, it does not need a savant to see where a little could be added to the credit side of railway economy.

AN ONLOOKER.

#### USE OF FORM 19 FOR TRAIN ORDERS.

COLUMBUS, Ohio, March 11, 1912.

TO THE EDITOR OF THE RAILWAY AGE GAZETTE:

On the subject of the exclusive use of 19 form of train order (*Railway Age Gazette*, March 8, page 418) it is the unanimous opinion of our dispatchers, including the chief, that the exclusive use of form 19 is just as safe as the exclusive use of form 31 would be. During an experience covering four years on a busy single-track road there has been no instance where the use of the 19 form of order was not entirely satisfactory. This form of order has been used almost exclusively during that time.

M. S. CONNORS,

General Manager, Hocking Valley Railway.

FROM AN OFFICER OF THE NEW YORK, NEW HAVEN & HARTFORD.

Mr. Finan's opening paragraph I believe is in accord with the view of all railway officers; but the complete elimination of the 31 order is a question that cannot be settled without considering the conditions under which the operators are working, and the characteristics and density of traffic. For a dispatcher to restrict a train's rights without getting any assurance that the crew is aware of these restrictions is a serious matter. On busy lines where passing sidings are close together the use of form 19 alone would seem to demand at least that trains be held up and crews given opportunity to read orders before proceeding; but this is what Mr. Finan wishes to do away with. It is not uncommon on some of our busy divisions for trains to receive from five to ten orders at a station. In passing orders to a train in motion there is the liability of the orders becoming mutilated or soiled; and if the crew were hustling to make a certain station they might get by a meeting point before they were thoroughly familiar with the contents of all the orders. This might perhaps be called a man failure and not the failure of the system; but the result is the same; we are responsible for the system.

On many lines this system of operating under 19 orders only would probably result in as much delay as under the old system. Our operators who also handle ticket work and the towermen in some cases cannot be spared from their offices to watch and wait outside for trains; so if the rule were for operators to go out and deliver orders it would result in the crews waiting for the operator. They would wait for him to come out rather than go to the office themselves. The alternative would be to employ many additional operators, the cost of which would neutralize the saving effected by not stopping and starting trains.

What should be done if an operator failed to deliver an order to a crew but claimed he had delivered it and the crew claimed not? Or, if the operator did deliver an order to a crew and the crew claimed not, it would be two against one.

Can it be shown that there will not be as many failures under the 19 system as under the 31? I believe not, after form 19 has had the trial that the 31 has been subjected to for over 40 years.

In the "hazards" mentioned in Mr. Finan's article there is one in which he says a 31 order was sent to a passenger train and the operator failed to display his stop signal and failed to deliver the order; presumably he forgot. If it had been a 19 order might he not have forgotten to display the stop signal or to go out? A dispatcher, knowing that he has a 31 out and that a train is about due to sign it is watching for the signatures; and if he does not get them promptly, he calls on the operator for them. If the operator lets the train go without the order the dispatcher knows it and has a chance to stop one or the other train at the next office. If it were a 19 order the dispatcher would take it for granted that the order had been delivered; and if the operator forgot he would probably forget to tell the dispatcher about it until too late to catch either train.

FROM AN OFFICER OF THE UNION PACIFIC.

Our general and division officers agree that the use of "19" orders to restrict rights should not be extended to lines not having automatic signals.

The "19" order has been extensively and successfully used; it is a wonderful help in expediting trains. With automatic signals it is as safe as the staff system; and it is even better, because it provides short blocks for following movements.

On the Union Pacific a train finding a train order signal at proceed must stop and find out why the operator did not clear it within the view of the engineman. This rule tends to counteract forgetfulness.

To use "19" orders universally without block signals would require 100 per cent. efficiency. One failure to deliver an order, its number at the same time being omitted from the clearance card, would be sufficient to justify the wisdom of always providing an extra precaution.

#### CAR DEPARTMENT APPRENTICES.

WASONETA, N. J., March 20, 1912.

TO THE EDITOR OF THE RAILWAY AGE GAZETTE:

I have read your editorial on "Car Shop Apprentices" in the issue of March 15 with a great deal of interest and would like to reply from the standpoint of an old master car builder, first, however, making an explanation as to why there are not more car shop apprentices and why there are not more men seeking positions in the car department. The facts are, the car department has generally been the "under-dog" in the operating department.

The motive power men and the motive power positions have been sought in the past, chiefly because higher wages and higher salaries have always been paid to machinists and motive power officers. As wages to a workman are his staff of life, he naturally looks for work in the department where he can make the most money. I have had a number of men in my department petition me to get them into the motive power department, as they could see there was a better chance to advance in that department than in the car department.

You state that: "Railway presidents and managers are exploring the fact that there is not a sufficient supply of good material among the younger men in the car shops from which they can make promotions to responsible positions." I am not at all surprised at this, as some railway officers have thought that the car department was of secondary importance and did not require a very responsible man at its head; or, in other words, a

man in charge of the car department need not be as efficient as the motive power man, and generally the car department has been placed under the motive power officers. With all due respect to many of the motive power officers who are competent and have great knowledge of both the motive power and car departments, yet a large per cent. of the men brought up as machinists are neither eligible nor competent to handle the details of both departments.

I am of the opinion that the car department men in the future have as bright, if not brighter prospects, than the motive power men of today. I predict that inside of 20 years most of the railways in this country will be electrically run, and the car men are as competent and eligible to work up into the electrical department as the motive power men are.

I am saying this carefully and guardedly as I have been connected with railways that had only one head over the motive power and car departments; and I am free to say that it was always the locomotives first and the cars second; in shops where joint forces are used, invariably you will find, if there is any lost or dead time to be charged up, it will be "freight car repairs can stand it." I believe the only way to keep the cost records accurate is a separation of the two departments.

I was pleased to note that you mentioned the number of car men that had been promoted in charge of both departments on one of the large trunk lines but you omitted to mention H. F. Ball, former superintendent of motive power of the Lake Shore & Michigan Southern, who was at one time general car inspector of that road; also the late J. Barr, of the Chicago, Milwaukee & St. Paul, who was at one time in the car department. I have possibly said too much relative to the motive power department as compared with the car department, but I have tried to make clear why there are not more young men seeking to get into the car department.

The car department generally represents more value in rolling stock than the motive power department, and repairs to freight cars and passenger cars are such that it requires a very competent man to be in charge of the department and to select foremen who are in position to save or spend thousands of dollars a year in the repairs to cars.

You state that: "The fund should be sufficient to permit of salaries for foremen and superintendents which will be attractive to educated men of high character and good ability." No truer words were ever spoken and within the last few years this has been realized by many managers. On some roads the car department is receiving its just recognition as to shop facilities and the selection of proper men, even to the foremen in charge of the shops.

Referring to the design of steel passenger and freight cars where you say, "very few men are found in the railway car department who are competent to do the designing. The mechanical engineers have been drilled along the lines of locomotive building, not car building, simply because they have been advised when they were seeking positions to take up locomotive and not car work."

You say that the motive power men—those whose training has been almost entirely in the locomotive department—now dominate the two great railway mechanical associations, and the master car builder is no longer regarded as eligible to the principal offices of the Master Car Builders' Association. The change in electing officers in the Master Car Builders' Association was brought about for certain reasons which at the time were well understood by all connected with that association, and had nothing whatever to do with men holding positions as master car builders. It was thought advisable that the officers in the association should be men that were at the head of a department and it is very unfortunate that there are only a few master car builders at the present time who are at the head of their own departments.

A very few of the trunk lines have a master car builder or a superintendent of rolling stock who reports direct to the general manager. The above is the only reason why the change was

recommended for officers in the Master Car Builders' Association, and I can point with a great deal of pride to the list of past presidents of the Master Car Builders' Association as containing some of the most brainy and competent mechanical men of this country and who were at the heads of the car departments on their roads.

You speak of the freight car truck—the diversity of designs, etc., and also of the draft gears of freight cars which cause large expenditures for repairs, and are sold in a variety of designs which bear trade names instead of railway standards. You might also mention couplers. The Master Car Builders' Association is the one that got the M. C. B. type of coupler adopted. The Master Car Builders' Association today, through its car department forces and others is bringing out one standard design of coupler. Speaking of the friction buffer, which the article states is not very creditable to the men of the car department. The men of the car department might agree in recommending a friction buffer, but it must be remembered that there are others in authority that may not agree with them, consequently a standard buffer has not been adopted.

Referring to the necessity of training up a body of men who will have the ability to design cars and their details and to select with good judgment those which are purchased. This is very true, but it is a well known fact that the practical car man may have ideas regarding the building of a car, and also of maintaining standards, but others higher up may have different views on account of industries being on the line of the road, and for other reasons, so that the car department men's recommendations may be overlooked.

I thoroughly agree with the writer of the article that the locomotive department on many lines is now so large that it could well occupy the entire time of the motive power officers and there should be officers of equal rank in general charge of the car department. Under such an organization the car shop apprentice would have before him the opportunity of advancement to car foreman, superintendent of car shop and superintendent of the car department. In the past I am free to say that the car department on some railways has offered very poor inducements for a man of ability to ever expect to advance. I have been asked a number of times to recommend men for foremanship on different roads, and when asked what the salary would be, found it would run from \$50 to \$100 a month less than what they were paying some master mechanic in the motive power department, who did not have one-quarter the responsibility on his shoulders or one-fourth of the expenditure of money that the car department men would have. Is it any wonder then that in the past there have been so few men seeking positions in the car department?

The road with which I am connected believes that the motive power and car departments should be separate, and the very best results have been the result of separating them. We are doing everything we can to educate and bring out young men in the car department, not only by having apprentices, but by testing out the young men. We also endeavor to keep competent men in line of promotion to work up to foremen and master car builders.

Some officers have thought that there was economy in consolidating departments. In some cases this might be true, but in others it is false economy. There is an old saying that a little knowledge is dangerous. It is also true where any one man attempts to manage or control several departments. I am very glad to see this question agitated and am pleased to know that in the last few years some roads have taken a decided stand relative to the management of the car department. Mr. Barnum of the Illinois Central has just completed a good organization of the motive power and car departments of that road and has recognized a head of the car department.

Of course the ideal managed railroad is the one where all departments co-operate together for the interest of the road. This can only be brought about by having reliable, competent and recognized heads of each department.

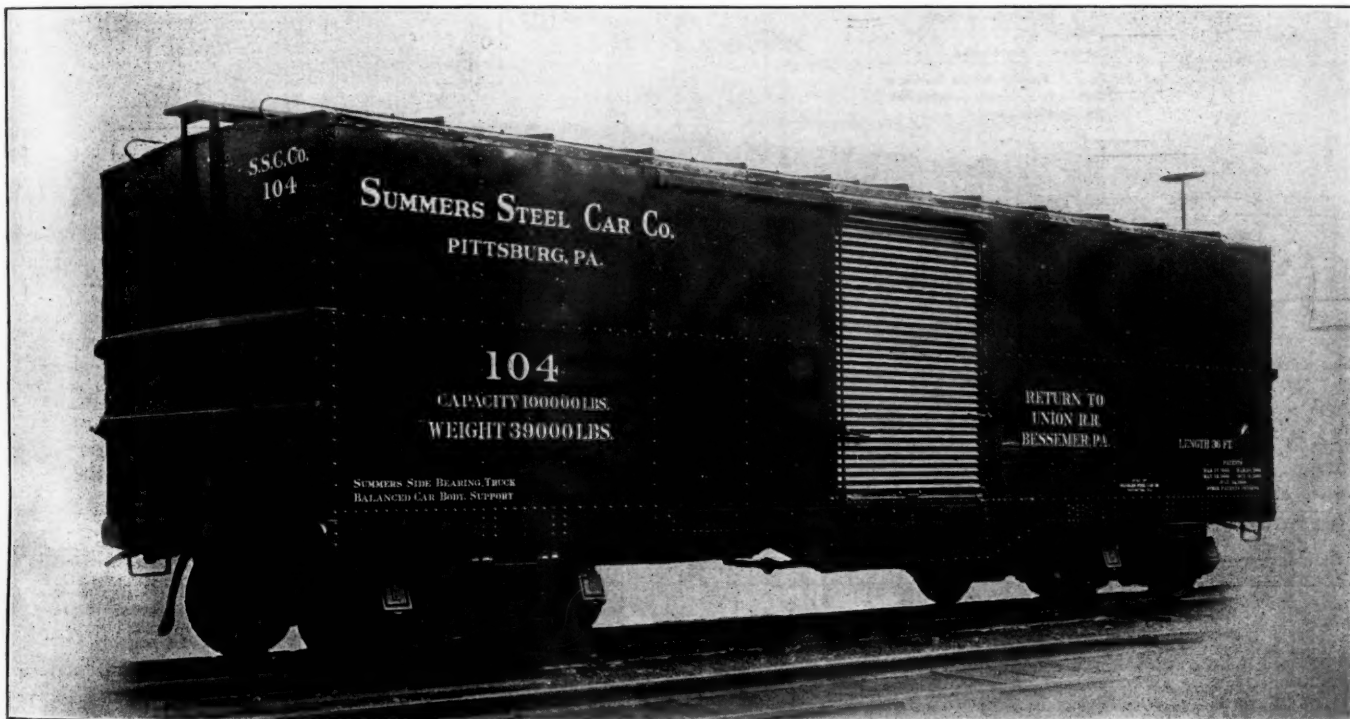
MASTER CAR BUILDER.

**ALL-STEEL BOX CARS.**

The first large order for all-steel box cars has just been awarded by the Bessemer & Lake Erie to the Summers Steel Car Company, Pittsburgh, Pa. A sample car of this type, built by the Summers Company, has been in service for the past two years, and the 100 fifty-ton cars which have just been ordered will conform to the sample car as far as the construction is concerned, except that they will be 4 ft. longer and the truck side frames will be of the regular arch bar type, but equipped with the Summers balanced side bearing features, the same as on the sample car. This balanced side bearing feature is a new and radical development in car truck construction and bids fair to come into general use because of enabling a car body of rigid construction to traverse twisted and rough track without throwing the twist into the car body or without danger of derailment. The construction of all-steel box cars is so rigid that without a truck of this kind it will be practically impossible to operate them safely. Refrigerator cars, tank cars, and other cars of similar construction are often derailed apparently because of

The draft gear is attached to draft sills constructed of  $\frac{3}{8}$  in. plate pressed to a channel shape. Similar pressed members or diaphragms, but constructed of  $\frac{1}{4}$  in. plate, extend between the cross beams above the center of the truck and just back of it. A bottom cover plate  $\frac{3}{8}$  in. thick extends underneath the rear end of the draft sills and for a distance of about 4 ft. toward the center of the car. The roof sheets are of Carnegie copper steel,  $\frac{1}{8}$  in. thick. The carlines are on the outside, leaving a smooth roof surface on the inside of the car. The construction is such that no rivets are driven through the roof plates to the inside of the car.

With this form of construction the car will weigh 43,000 lbs., or about 3,000 lbs. less than a steel underframe car of the same capacity and with the same inside dimensions. It is about 9 in. less in height at the eaves and the center of gravity is about 7 in. lower than for the steel underframe car. There are 12,000 lbs. more steel in the car and at the present prices of steel and lumber it can be sold in competition with the steel underframe type of car. It is expected that this order of 100 cars will demonstrate the practicability of the all-steel box cars. As shown on the



**All-Steel Box Car Similar to Those Ordered by the Bessemer & Lake Erie.**

their rigidity in connection with the rigid center bearing truck and rough track. The new truck has a flexibility which permits the car to travel over very irregular track without distorting the car body and at the same time prevents the hammer blows, due to transverse rocking, which are so injurious to the equipment, the lading and the track.

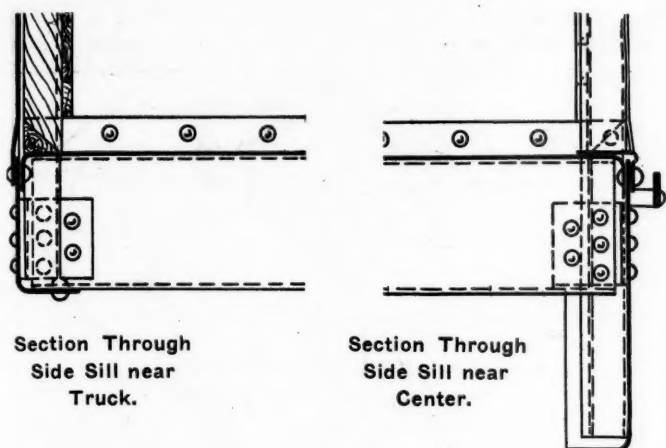
The inside dimensions of the new cars will be 40 ft. long, 9 ft. wide and 8 ft. high. The car has no center sills, the entire vertical load being carried on the side girders. The lower member of the side girder, or what corresponds to the side sill in an ordinary car, is a  $\frac{5}{16}$  in. pressed steel angle which is deepened near the center of the car. The lower half of the side sheet is a  $\frac{3}{16}$  in. plate and the upper half is  $\frac{1}{8}$  in. thick. The lower half of the end sheet is  $\frac{3}{4}$  in. thick and the upper half is  $\frac{1}{8}$  in. thick. The floor plates are  $\frac{1}{4}$  in. and are supported by 10 in. channels, which extend from side to side of the car. The side sheets are stiffened on the inside by 3 in. x  $\frac{3}{4}$  in. Z bars, weighing 6.7 lbs. per foot. The ends of the car are stiffened by the two horizontal pressed steel braces, the upper one of which covers the joint between the two halves of the end sheet.

cross section the car is lined with  $\frac{13}{16}$  in. yellow pine for a height of about 5 ft. Experience with the sample car thus far has demonstrated that no trouble is encountered due to moisture condensing on the inside of the car and thus damaging the lading. It is quite probable that the cars will be considerably warmer during hot weather than the wooden ones, but if this should be found objectionable it can possibly be overcome by lining or insulating the inside of the car.

The truck arrangement is such that the whole load is carried on the inclined hangers at the side of the car, approximately the same as if it were suspended from a point at the intersection of the center line of the hangers extended until they meet above the center of gravity of the car; this arrangement permits the car body to swing sideways at the bottom but does not allow the sides to sway at the top, with the attendant vertical hammering blows on the side bearings, springs and wheels.

A comparison of this truck and its performance with the standard or center-bearing truck will be interesting and instructive. The center-bearing truck, which at the present time is almost universally used, has one very grave disadvantage. The load

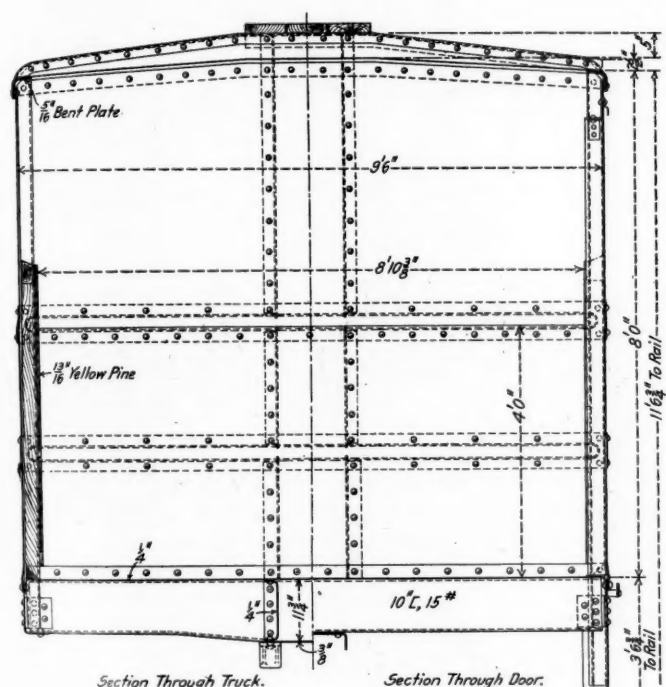




Section Through  
Side Sill near  
Truck.

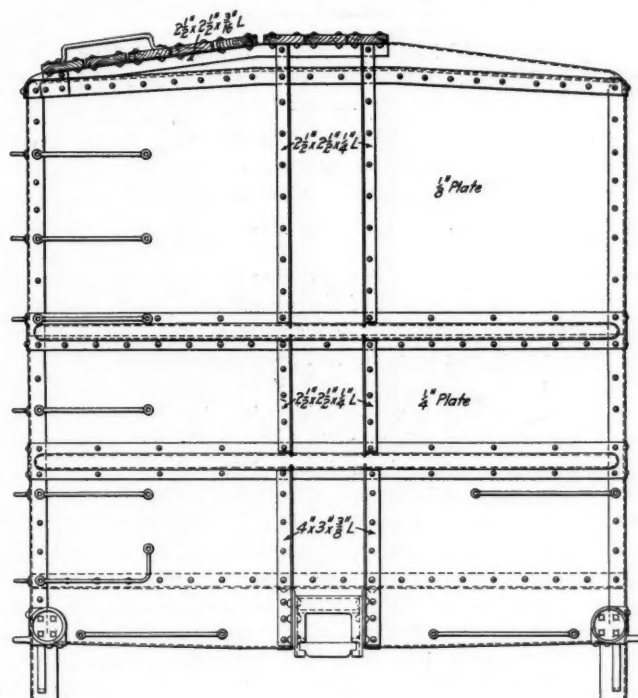
Section Through  
Side Sill near  
Center.

load of the car body being carried through these members to the side bearing or rocker cap *E*, thence into the segmental rocker *F*, which is journaled in oil in the spring cap *G*, transmitting the load through the springs and truck side frame to the wheels. The brackets *C* hold the lower ends of hangers *A* at a fixed distance transversely, while the cradle member *H*, to which *E* is secured, holds their upper ends. When the car is moving slowly along the track, any vertical change in track alinement is taken care of by the rotation of the hangers *A* about their upper ends. With high train velocity the cradle *H* will move instead of the car body, the hangers *A* rotating about their lower ends, thus allowing the car body to move in a straight line, the vertical changes in track alinement being converted into horizontal movement by reason of the difference in inertia of the car body and the cradle. The cradle *H* is held in central position by its center plate *K* and the king pin *L*. The latter has a limited lateral

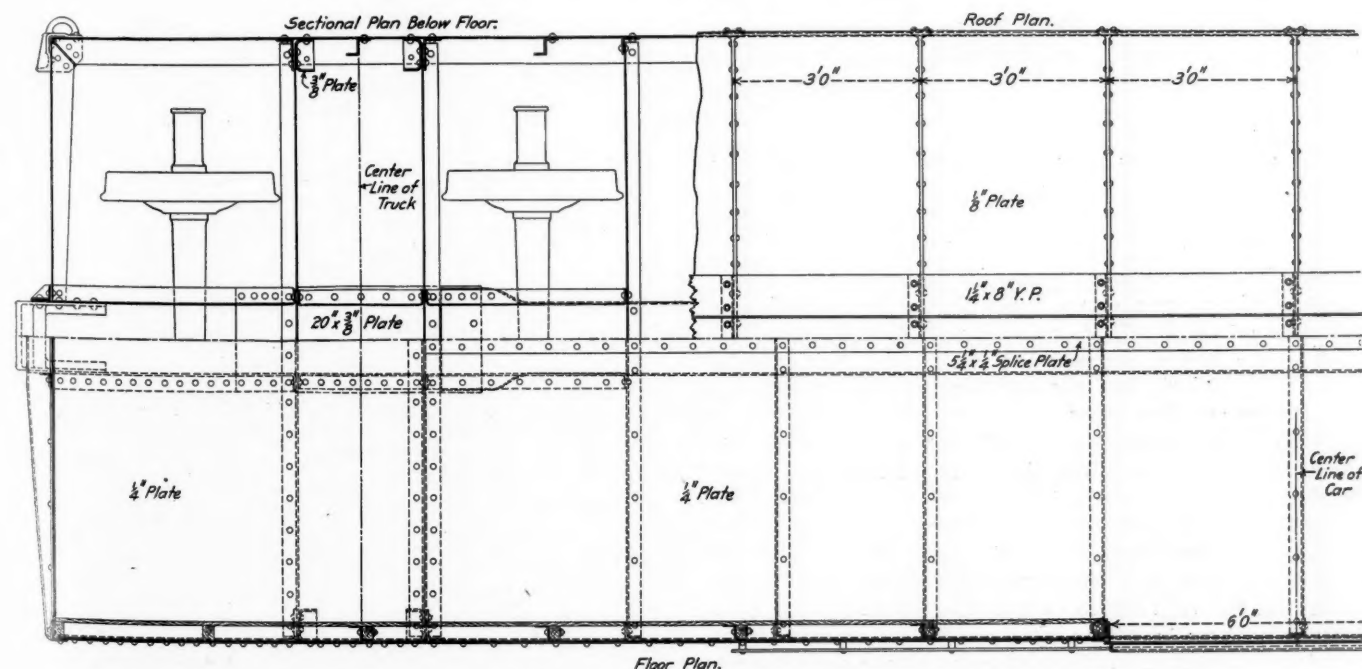


Section Through Truck.

Section Through Door.



End View and Sections Through Summers All-Steel Box Car.



Partial Floor and Roof Plans for All-Steel Box Car; Bessemer & Lake Erie.

movement at *M* and is returned to the central position by the springs *N*.

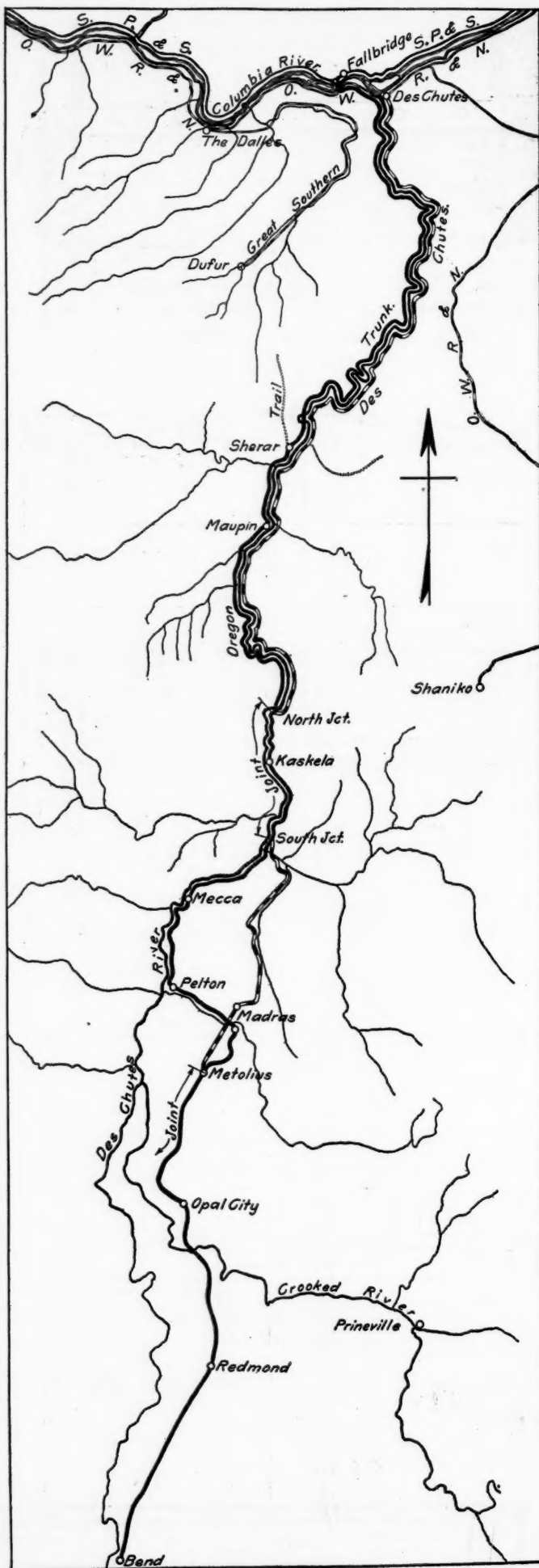
The king pin arrangement is clearly shown in the sections through the truck. The construction is of very generous proportions and indicates also that the parts that come into play in moving the truck along are located to advantage. The helical springs between the center pin and truck transom, act to check and cushion the transverse swerve of the car body on curves or uneven track; these springs also come into action when the car is traveling at high speed, absorbing the lesser vibrations independently of car, the body and the truck proper. This type of side bearing truck makes it possible to carry the load distributed on all side bearings under any track conditions, and thus distributes the load to all wheels. In a word the truck permits of a rigid car body being carried over rough track, the wheels moving up and down or transversely without transmitting the motion to the car body.

#### THE CONSTRUCTION OF THE OREGON TRUNK AND THE DES CHUTES RAILWAYS IN CENTRAL OREGON.

The driving of the golden spike in the track of the Oregon Trunk Railway at Bend, Ore., and the entrance of trains of the Oregon Trunk and DesChutes railways into this town a few weeks ago marked the closing of one of the most interesting conflicts in competitive railway construction which has been witnessed in recent years. The building of these two lines was equally interesting, because of the very difficult country through which they were built and the manner in which the numerous engineering problems were met. The construction of the Oregon Trunk was one of the first steps in the entrance of the Hill lines into Oregon, a territory which had been previously considered as belonging almost exclusively to the Harriman Lines. This invasion has since been followed by other inroads, especially in the vicinity of Portland, where the control of the Oregon Electric Railway, operating from Portland to Salem, has been secured, which road is now being extended south to Albany and Eugene. The history of the early conflict between the Hill and Harriman interests in the location of lines up the DesChutes river and ending with the decision of the United States district court at Portland has been discussed in the *Railway Age Gazette* of November 12, 1909, while the early features of the construction of both roads were described in the issue of March 18, 1910.

The DesChutes river rises in central Oregon and flows generally north, emptying into the Columbia river at Celilo, about 100 miles east of Portland. Flowing through an arid country it has worn its way through the volcanic rock formation until it now passes through a winding narrow canyon with very abrupt walls. As it is not subject to freshets to any marked degree, the river has a very uniform flow, averaging about 5,200 second ft., and a maximum variation in height of about 10 ft. This flow is practically constant for the lower 90 miles of its course, no tributaries of any consequence entering the stream in that distance. There are only two wagon road crossings of this river in this 90 miles; one a county bridge located at the station of Freebridge on the DesChutes railway, about 5 miles above the mouth of the stream, the other an historic toll road crossing at Sherar 40 miles farther south on the main trail between interior Oregon and The Dalles.

As soon as railway construction was contemplated through this canyon papers were filed with the government for three dam sites for power development. The three projects contemplate dams 140, 100 and 60 ft. high, and are located about 2, 20 and 40 miles respectively from the mouth of the stream. The first and last sites were filed on by private corporations, while the middle site is reserved by the United States government. Although no steps have been taken toward the construction of any of these dams, it was necessary for both roads to locate above these proposed high water lines to avoid possible future trouble. This added about \$1,000,000 to the cost of each road.

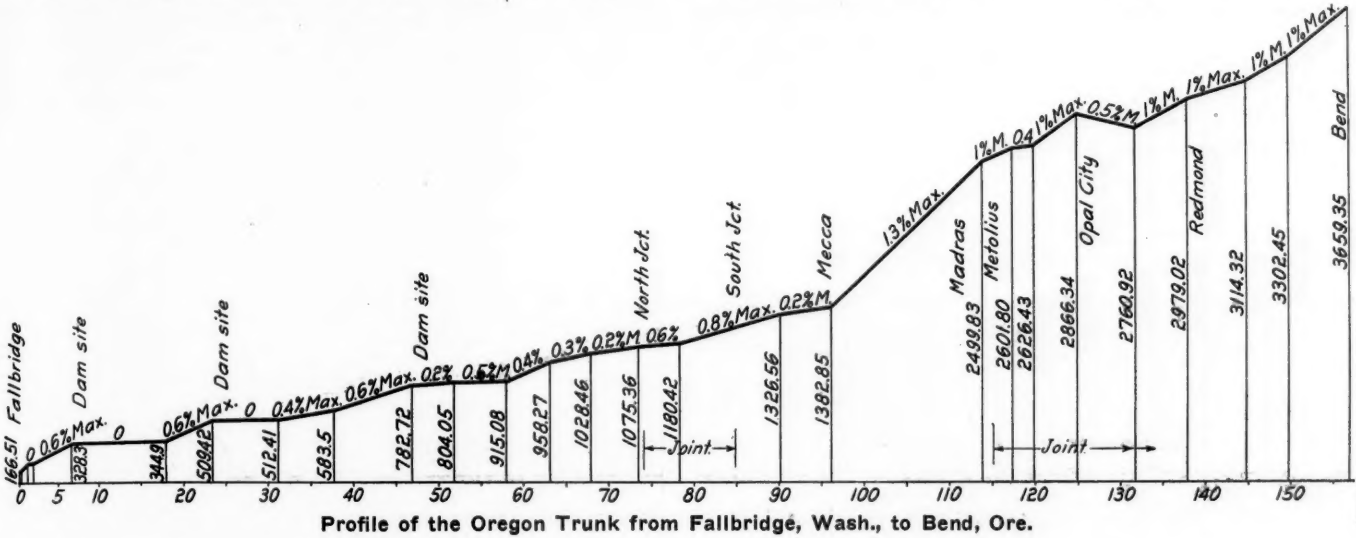


Oregon Trunk and Des Chutes Railways.

THE OREGON TRUNK RAILWAY.

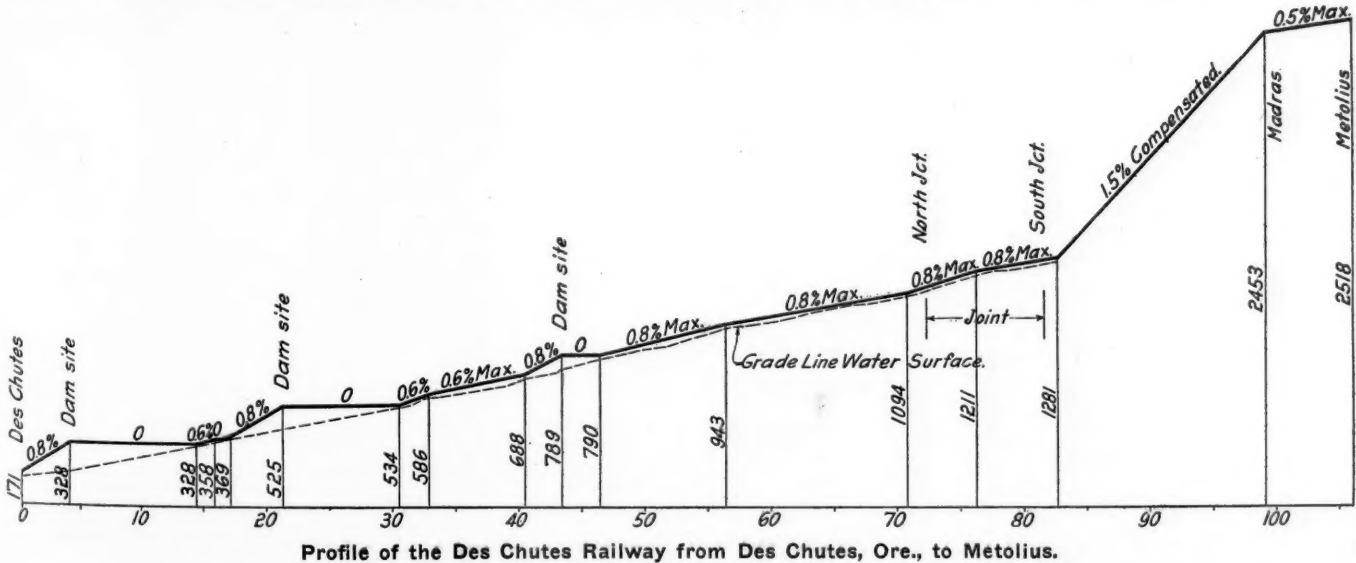
The Oregon Trunk Railway, which was built as a subsidiary of the Spokane, Portland & Seattle, or "North Bank Road," starts from a connection with this line at Fallbridge, Wash., and crosses the Columbia river and the main line of the Oregon-Washington Railroad & Navigation Company on the south bank on a long steel bridge. The line then follows the DesChutes

115 ft. rise just north of Crooked river and a small sag south of Redmond. Both of these sags have 0.5 per cent. grade against northbound trains. The maximum curvature is 6 deg., except at three points, where higher curvature was allowed on temporary lines which it is intended to replace by tunnels when the traffic justifies the additional expense. One of these tunnels will be 2,300 ft. long. The percentage of



canyon for 75 miles to North Junction, being located on the west bank, except at one point about 4 miles north of Sherar, where it crosses the river to avoid a long detour, and after passing through a tunnel immediately crosses back to the west side of the canyon. At North Junction the line crosses to the east bank of the river and continues on this side to Pelton, 105 miles from Fallbridge. It was on the 11 miles immediately south of North Junction that the early conflict in surveys occurred. These were finally settled by a contract, stipulating that the line should be built by the Oregon Trunk and operated jointly

curvature is very large, especially north of Pelton, where the line is forced to follow the wanderings of the river. Because of the standards of grade and curvature adopted, which are very high, considering the nature of the country through which the line was built, the grading was very heavy, averaging over 55,000 yds. per mile. The total amount of material handled amounted to 8,779,803 cu. yds., of which 152,349 cu. yds. were necessary for excavation for bridges and culverts. The following table gives the classification of the material handled, from which it is noted that 68.8 per cent. of



by both roads. At Pelton the line leaves the canyon of the DesChutes and turns into Willow Creek canyon, following this stream until it rises to the level of the table land at Metolius. It then continues south on this table land to Bend, 156 miles south of Fallbridge. In this distance the line rises from an elevation of 140 ft. at Fallbridge to 3,630 ft. at Bend. The maximum grade is 0.6 per cent. for the first 95 miles to Mecca, from which point a 1.3 per cent. pusher grade extends to Metolius. From Metolius to Bend the maximum grade is 1 per cent. All grades are compensated at the rate of 0.04 per deg. There is no adverse grade against northbound trains, except a

the material handled was solid rock, and 15.4 per cent. loose rock:

	Fallbridge-Madras.		Madras-Bend.		Fallbridge-Bend.	
	Cubic Yards.	Per Ct. of Total.	Cubic Yards.	Per Ct. of Total.	Cubic Yards.	Per Ct. of Total.
Grading and Excavation—						
Earth .....	523,589	6.8	75,234	7.8	598,823	7.0
Solid rock .....	5,281,991	69.0	662,155	68.8	5,944,146	68.8
Loose rock .....	1,192,862	15.5	108,501	11.2	1,301,363	15.1
Hard pan .....	665,836	8.7	117,286	12.2	783,122	9.1
Totals .....	7,664,278	100.0	963,176	100.0	8,627,454	100.0

	Fallbridge-Madras.		Madras-Bend.		Fallbridge-Bend.	
	Cubic Yards.	Per Ct. of Total.	Cubic Yards.	Per Ct. of Total.	Cubic Yards.	Per Ct. of Total.
<b>Bridges and Culvert</b>	<b>Excavation—</b>					
Earth .....	4,648	3.2	1,618	20.8	6,266	4.2
Solid rock .....	77,749	53.9	3,479	44.7	81,228	53.3
Loose rock .....	45,387	31.4	1,817	23.4	47,204	30.9
Hard pan .....	16,786	11.5	865	11.1	17,651	11.6
Totals .....	144,570	100.0	7,779	100.0	152,349	100.0

It was necessary to blast practically all of this rock before it could be handled, and all drilling had to be done by hand. With the exception of about 200,000 yds. of material near the north end of the line, which was moved by steam shovel, all excavation was done by hand. This is one of the largest pieces of railway construction done in this manner in recent years, and it is especially interesting because of this fact. There were at one time on this work 1,140 1½-yd. cars, 600 horses and 62½ miles of 20-lb. track. This method of handling excavation was made necessary by the remoteness of the west side of the

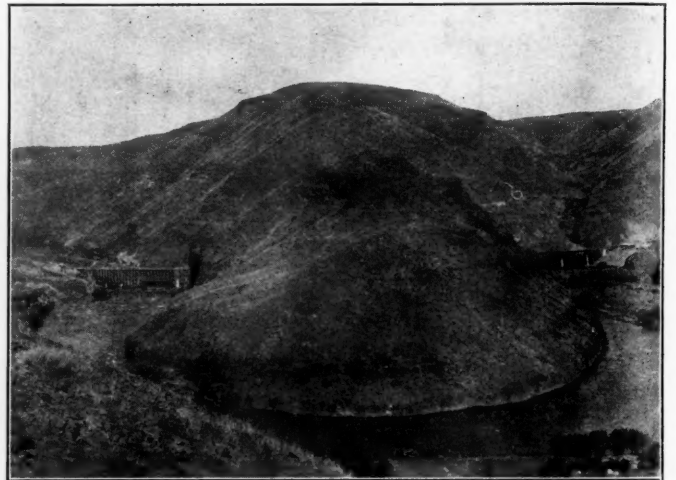
parallel until August, 1910, and the divergence here is due to the fact that at this time a large part of the grading was being completed, and that while the forces were being reduced the estimates were being increased by the retained percentages held back until completion of the contracts.

The roadbed is graded 18 ft. wide on earth and 16 ft. wide on rock fills, while cuts are made 24 ft. wide in earth and 20 ft. in rock. The cuts were made with 1 to 1 slope in volcanic ash, and ¼ to 1 in rock. Seven tunnels were built varying in length from 415 to 800 ft., and with a total length of 3,968 ft. These tunnels were lined with timber at the time they were constructed, but contracts have recently been let for relining all but one of them with concrete.

Nine steel bridges were built in addition to the Columbia river crossing. This latter bridge consists of 16 deck girder spans 102 ft. long, six through truss spans 230 ft. long, one through draw span 250 ft. long, one 320 ft. pin connected



Temporary Bridge and Piers of the Second Crossing of the Des Chutes and Oregon Trunk Railways.



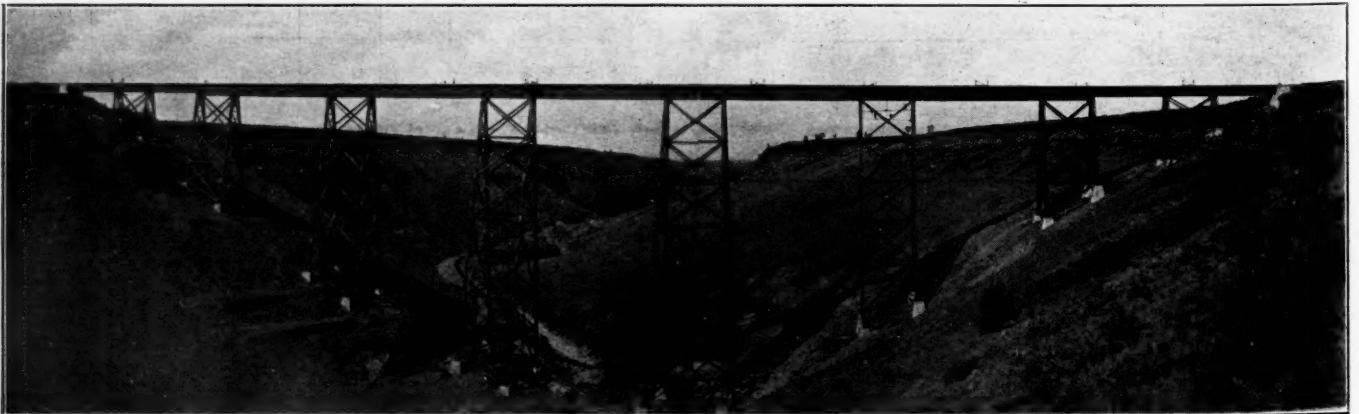
First and Second Crossings of the Des Chutes River; Oregon Trunk Railway.

canyon from transportation facilities and the impossibility of getting heavy equipment in on to the work. It was even impossible to bring in supplies over the Shaniko branch of the Oregon-Washington Railroad & Navigation, except at a few points, because of the absence of crossings over the river.

As it was, it was necessary to build over 60 miles of wagon roads in order to get supplies and materials in to the men scattered along the line. In handling the work the practice of the contractors was to do as much of the excavation as possible by station men, three or four men together taking the contract for a short section. In this connection, the curves showing the man-days work and cubic yards moved per month are instructive. As would be expected, these curves are closely

through span, one deck girder span 76 ft. long, two deck girder spans 75 ft. long and two half through girder spans 75 ft. long. The next most important structure was the bridge over Crooked river, which consists of two deck girders 60 ft. long and an arch span 340 ft. long. A description of these and the other steel structures on this line will be included in another article to follow shortly. In addition to the steel structures, about one mile of wooden trestle was built, most of which will be filled at an early date. All timber structures will be protected from fire by the construction of gravel ballasted decks. Corrugated iron culverts are used for pipe openings.

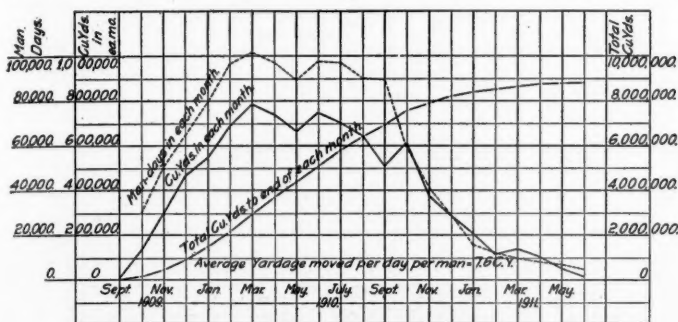
According to the Oregon law railways are required to be fenced on both sides within three months after they start running trains. A new law passed at the last legislature gives the



Willow Creek Viaduct Near Madras on the Des Chutes Railway; Oregon Trunk Railway in the Bottom of the Canyon.

State Railroad commission authority to relieve a company from fencing such part of its right of way as in the judgment of the commission is protected by natural barriers, as steep cliffs or bodies of water. Advantage was taken of this new law and permission was obtained to omit about ten miles of fence in the DesChutes river and Willow Creek canyons. The fence that is being erected has four barb wires, with cedar posts 24 ft. apart and two wire stays in each panel of fence.

The track is laid with Great Northern section 90-lb. O. H. steel rails and angle bars on untreated sawed fir ties, with 10 in. of ballast below the ties. The rails are laid with staggered joints. Tie plates are placed on curves and on all tangents less



Progress of Excavation; Oregon Trunk.

than 500 ft. in length. Tangents longer than this are tie-plated 100 ft. out from the curves. Passing tracks 3,000 ft. long are built at intervals of about seven miles and are laid with 70-lb. rails. No. 11 turnouts are used entirely in the main line and side tracks are built to 14-ft. centers. All track north of Crooked river bridge was laid by contract, while that south of the bridge was laid by company forces.

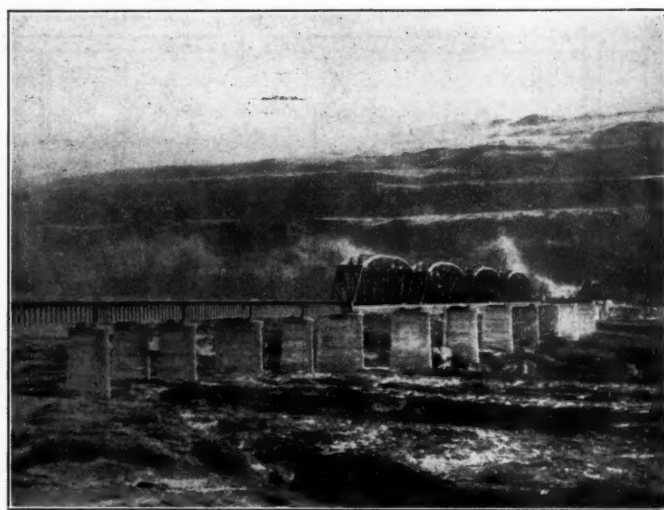
The ballast used was partly gravel and partly burned clay. The gravel used on the north 50 miles of track was secured from a pit on the Spokane, Portland & Seattle on the north bank of the Columbia river, and was transferred across the river on a car ferry. Another pit was located south of North Junction, from which material was secured to ballast the line as far south as Metolius. In a cut two miles south of Opal City a natural burnt clay was encountered. After track was laid a ballast pit was opened at this cut from which material was secured to ballast the line from Metolius to Bend. This burnt clay is bright red in color and makes excellent ballast material, but is difficult to handle, as it contains ridges of lava which it is necessary to break up and to separate from the clay. In this way about 15 per cent. of the material is wasted in the pit or at the side of the roadbed, but even with this disadvantage the excellence of the material and the advantageous location of this pit made it the cheapest available ballast, there being only two other available supplies—first, from a pit on the S. P. & S. Railway, 130 miles away and at 2,500 ft. lower altitude, and second, to install a rock crusher. All ballasting was done by company forces.

The water stations built were of two types. At the larger number of stations tubs were placed directly on the side hill with standpipes along the track to deliver water to the engines. Where the side hill was not close to the track the tub was erected on posts in the usual manner. The standard tank is 16 ft. by 24 ft. in size, and of 50,000 gal. capacity. From Pelton north the water is secured by pumping from the river at all stations, except at Tuskan, where the supply is secured from a large spring. At this point a 23,000-gal. rectangular concrete tank was erected on the side hill and the flow of the spring was led into the tank and out over a concrete spillway near the top. The flow of this spring is sufficient to completely fill the tank every 17 minutes. At Pelton, where the line leaves the DesChutes river, water is lifted 550 ft., and through 6,000 lin. ft. of pipe by a 50 h. p. gasolene engine direct connected to a 4½ x 10-pot valve pump. South of Pelton the water is

secured from deep wells drilled with much difficulty through the broken lava formation. At Metolius, where two wells were sunk, it was necessary to drill through 300 ft. of lava and boulders, and then through 300 ft. of rock to secure a sufficient supply. At this point a deep-well pump delivers water into a 175,000 gal. concrete sump built below the ground, which acts as a storage reservoir from which a small pump then raises the water into a supply tank.

In connection with the construction of the Oregon Trunk Railway it was necessary to establish complete terminal facilities at Fallbridge and a terminal was also built at Metolius. Trains are operated from Fallbridge to Metolius, a distance of 115 miles, while turn-around runs are arranged from Metolius to Bend, 42 miles. A wye was built for the use of the helper engine at Mecca, and another at Bend. The location of the junction with the Spokane, Portland & Seattle at Fallbridge rendered advisable the moving of the yard at Cliffs, 20 miles further east, to this point and building one yard here for the use of Spokane, Portland & Seattle main line traffic as well as interchange with the Oregon Trunk. Accordingly, a classification yard, consisting of four tracks 4,000 ft. long and two tracks 3,600 ft. long, was built, together with the usual tracks about the engine house. A rectangular engine house, 180 ft. long, with six tracks, each holding two engines, and with entrance at each end, was built. An 80-ft. turntable has also been provided. As oil is used exclusively for fuel on both roads, oil storage tanks were necessary. A 30,000-barrel tank, 90 ft. in diameter, was placed on the side hill and supplies the service tanks along the track. As there had been no town here previous to the construction of this yard it was necessary to provide accommodations for the trainmen laying over between runs. In contrast with the general practice, the eating house was built separate from the hotel so that those sleeping would not be disturbed by the others in the lunch and reading rooms.

A similar yard was built at Metolius and will be used by the Oregon Trunk and DesChutes roads, the connection between



Celilo Bridge Nearing Completion; Oregon Trunk.

the two roads being made just north of the north end of the yard.

One feature which stands out very prominently in the construction of this line at the smaller stations as well as at the terminals is the building of attractive and serviceable depots and section houses. Houses are furnished for the section foremen on each section, with bunk houses removed some distance from the section house for the use of the laborers. These buildings were all completed and ready for occupancy at the time the line was put into service. They are painted the standard colors, yellow buff with bronze green trimmings. There are three standard sizes of depots, living quarters being pro-

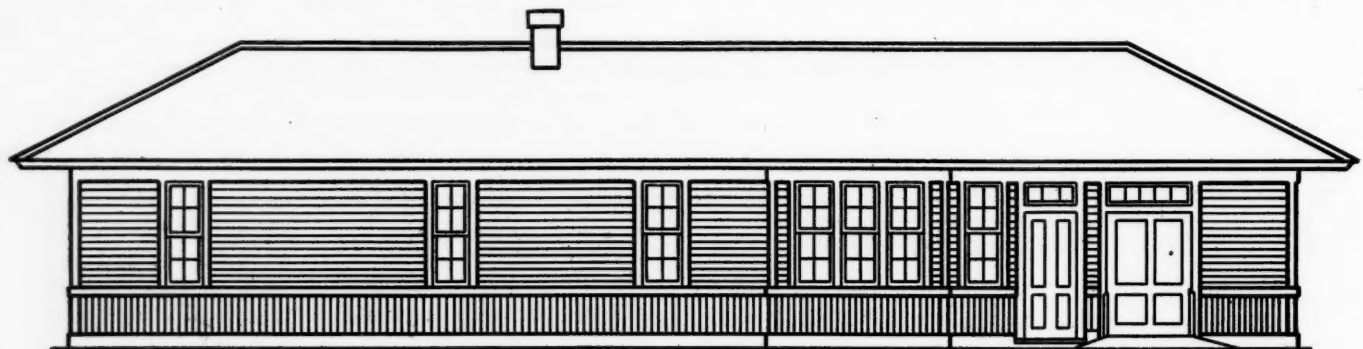
vided for the agent and family in the two smaller sizes. All buildings are one-story. The larger stations are 30 ft. by 115 ft., and are located at Fallbridge, Madras, Metolius and Culver. In the Fallbridge depot, where considerable perishable freight will be transferred, a warm room is provided. The station building at less important points is 36 ft. x 60 ft. in size, while that built at the most unimportant points is 18 ft. x 68 ft.

Awaiting the completion of the bridge across the Columbia river, all freight and passengers were transferred by ferry. As soon as construction work was undertaken a ferry transfer became necessary. Inclines were built on each side of the river and a steamboat and a car float were purchased. The inclines were built on 5 per cent. grades and were designed to provide for a wide variation in stage of the water, which variation reached 30 ft., while the ferry was in service without inter-

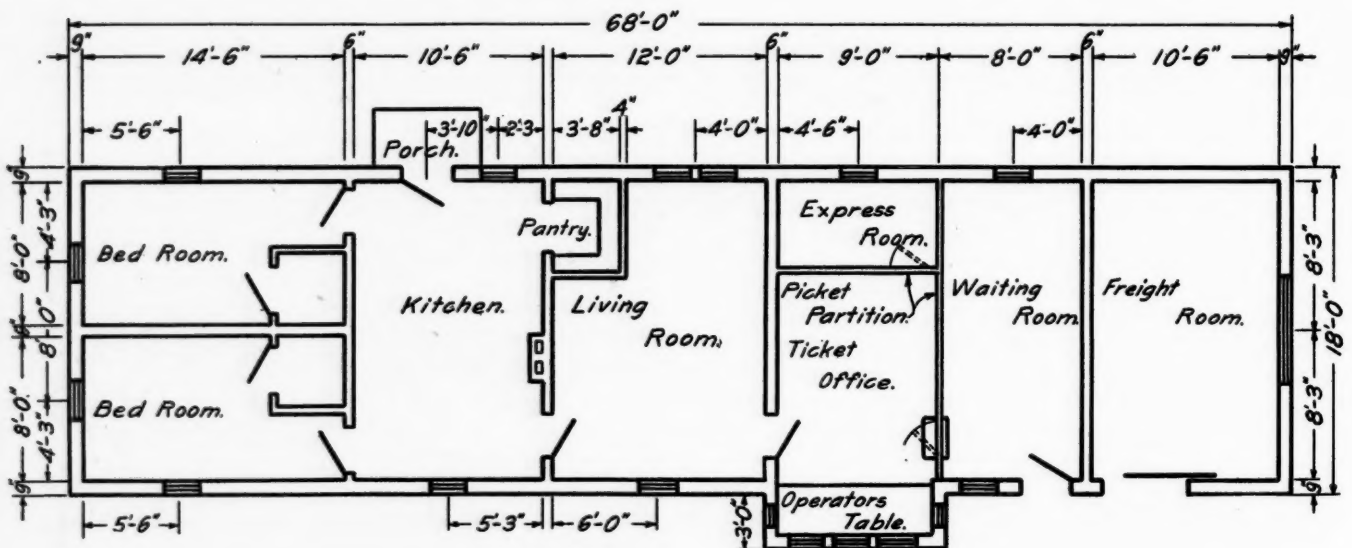
H. C. Henry of Seattle had the contract for the grading from Madras to Bend, while Bates & Rogers had the contract for all concrete work south of the Columbia river.

#### DES CHUTES RAILWAY.

The DesChutes railway has been constructed as a subsidiary of the Oregon-Washington Railroad & Navigation Company, and starts from a connection with the main line of this road on the south bank of the Columbia river at the station of DesChutes, about three miles east of the mouth of the DesChutes river. It was necessary to change the original plan of establishing this junction at the mouth of the canyon on account of the necessity for raising the location of the road above the high water line of the lower power project. The new line parallels the O.-W. R. & N. main tracks from the mouth of the canyon to



Front Elevation.



Plan.

Plan and Elevation of Standard Depot for Medium Size Towns; Oregon Trunk Railway.

ferring with its operation. Because of government restrictions regulating the operation of ferries for passenger service, the passenger coaches were not transferred back and forth across the river. The car ferry has a capacity of eight cars. An enormous amount of material has been transferred since the work was started without any accident. Material of all kinds used in the construction of the line, including rail, ties, bridge material and ballast for 50 miles of line, have crossed in this manner.

This line was built under the direction of John F. Stevens, president; Ralph Budd, chief engineer, and J. C. Baxter, division engineer. Porter Brothers of Portland did the grading from Columbia river to Madras, and also laid all the track north of Crooked river bridge and placed the concrete work for the substructure of the bridge across the Columbia river.

DesChutes, the additional distance being necessary to get down to the level of the other tracks on the maximum grade. The DesChutes railway follows the east side of the canyon all the way to South Junction, a distance of 82 miles, the last 10 miles of which is joint track with the Oregon Trunk. At South Junction the line turns into Trout Creek canyon and ascends this stream to the level of the table land at Madras, crossing over the line of the Oregon Trunk at this point at an elevation about 275 ft. above that of the other road. The DesChutes line then continues southerly to Metolius, where it connects with the Oregon Trunk, using its tracks for 41 miles in Bend. The maximum grade of the DesChutes railway is 0.8 per cent. for the first 82 miles to South Junction, from which point there are 16 miles of 1.5 per cent. pusher grade. From Madras to Metolius the maximum grade is 0.5 per

cent. There is no adverse grade against northbound traffic north of Metolius. All grades are compensated for curvature at the rate of 0.035 per deg. up to 6 deg., 0.045 per deg. between 6 and 8 deg., and 0.05 per deg. up to 10 deg. The maximum curvature is 12 deg., with two curves of the maximum. There are about 820 deg. of curvature above 10 deg. All curves are spiralled according to Harriman lines standards.

The grading of the DesChutes road was much lighter than on the Oregon Trunk, due largely to the higher grades and curvature allowed. The line followed more closely the bottom of the canyon and was thus able to avoid much of the heavy side hill work. The general topography of the canyon was also more favorable to railway construction on the east side than on the west. The roadbed was built 14 ft. wide on fills and 16 ft. wide in cuts. There are five tunnels on the line ranging from 500 to 1,200 ft. in length, all of which are timber lined.

While it was necessary to handle most of the excavation by hand, it was possible to get some equipment on to the work by knocking it down and shipping it in on the Shaniko branch of the O.-W. R. & N. In several instances this heavy equipment was lowered to the line in the bottom of the canyon on special skids erected for this purpose.

High steel viaducts were erected at the crossing of Trout and Willow creeks. The Willow creek viaduct is 1,050 ft. long and 275 ft. high above the top of the pedestal. This viaduct passes over the tracks of the Oregon Trunk about 275 ft. below, as shown in the accompanying view. It consists of eight 40-ft. tower spans, with five 100-ft. intermediate spans, one 50-ft. approach span on the north end and two 60-ft. approach spans on the south end. Trout creek viaduct is located a short distance south of South Junction, and has a maximum height of 100 ft. above the top of the pedestals. It consists of four 40-ft. towers, with one 100-ft., one 60-ft. and one 40-ft. intermediate spans. The north approach consists of two 50-ft. spans supported on a single center bent, while the south approach consists of two 40-ft. spans similarly supported. With the exception of these two structures the bridge work is light, consisting largely of timber bridges which will be replaced with permanent structures at a later date. These trestles are covered with galvanized iron, extending between the stringers as a protection against fire. Corrugated pipe was used for all pipe openings. While the original location contemplated the construction of an independent line to Redmond, necessitating a bridge across Crooked river, the joint track arrangements south of Metolius eliminated this structure. Because of the absence of this bridge as well as crossings of the DesChutes and Columbia rivers, the bridge work on this road was light as compared with that on the Oregon Trunk.

The track is laid with new 75-lb. rail with continuous joints. Tie plates are used on all curves and on all bridges. All track was laid by company forces, using the L. C. McCoy common track laying machines, invented by the assistant engineer in charge of track laying and bridge work. The track is ballasted largely with material secured from the adjacent right of way. Steel tanks of 65,000 gal. capacity were erected at Madras gateway, and at the helper station at South Junction. Temporary wooden tanks were erected at other points until such

time as permanent tanks can be built. North of South Junction water is secured by pumping directly from the DesChutes river, while at Madras it is obtained from a deep well.

As the freight transfer between the O.-W. R. & N. and the DesChutes railway will be made at the existing terminal of the O.-W. R. & N. at The Dalles, 17 miles east of DesChutes Junction, and as this road will use the yard of the Oregon Trunk at Metolius, it was not necessary to construct any classification yard on this line. Small terminal facilities were established at South Junction for the use of the helper engine, at which point water tank, oil storage facilities, turntable, clinker pit with depressed track, and two or three short tracks were built.

The DesChutes railway was built under the supervision of the engineering department of the O.-W. R. & N., G. W. Boschke, chief engineer; John D. Isaacs, consulting engineer, and L. C. McCoy district engineer. The contractors for the grading and concrete work were Twohy Brothers. We are specially indebted to Mr. Budd and Mr. Boschke for much assistance in preparing this article.

#### VARIATIONS IN LOCOMOTIVE TRACTIVE EFFORT WITH SPEED.

BY A. S. WILLIAMSON.

Two methods are in general use for estimating the variation in locomotive tractive effort with speed. The more common one is based on cylinder power, and consists of modifying the maximum tractive effort by factors which express the variable relation between mean effective pressure and speed. In the second method, the rate of steam production is divided by the rate of its consumption per horse power and the drawbar pull corresponding to this horse power is found, thus recognizing the limiting effect of the boiler upon tractive power. The validity of the first, or cylinder method, depends upon consideration having been separately given to relative boiler and cylinder capacities, and that of the second depends upon the ability of the cylinders to utilize all of the steam which may be supplied. Thus, in a given case it may happen that at slow speeds, tractive effort is limited by the cylinders, while at higher sustained speeds the boiler will not supply sufficient steam to give the mean effective pressure assumed in the first method.

In calculations based on boiler power, both the rate of evaporation and the cylinder water rate have frequently been assumed as constant throughout the entire range of working. Figures covering rates of evaporation have been based upon tests at high power, while water rates have been based indiscriminately upon tests at various percentages of full power. In the various reports of laboratory tests of locomotives, there is little data on the subject of water rates at slow speeds and long cut-offs. Thus the results of tests, say at 40 r. p. m. and 20 per cent. or 30 per cent. cut-offs, when plotted with full power tests at the higher speeds, give a somewhat flat curve of steam consumption which, while of interest in connection with average performance, may not represent with entire accuracy the variation in water rate with speed at the full (sustained) power on which locomotive rating is based. While an average water rate will furnish a

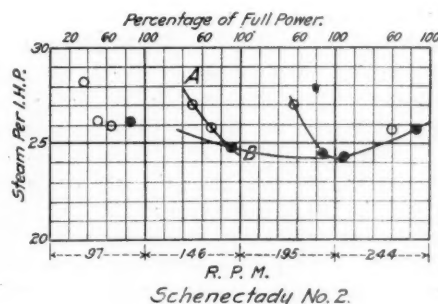
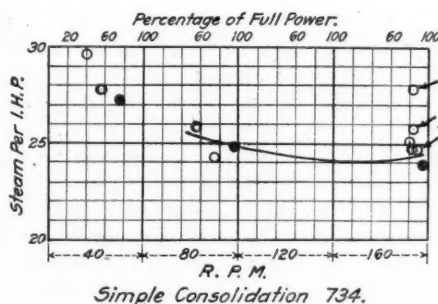
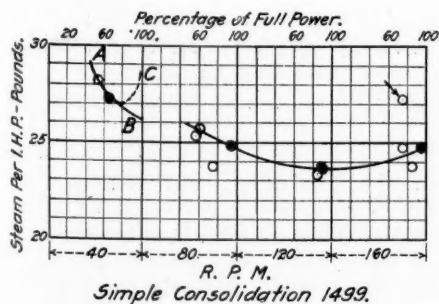


Fig. 1—Steam per I. H. P. for Simple Locomotives.

basis for comparison between different locomotives, the occasional attempts to use the method for more exact purposes suggests an examination of the variables entering into the calculation.

**Water Rates.**—The water rates found in the tests at St. Louis of each American-built locomotive which was run at high power, and which were recorded in the body of the report of the tests, are plotted in Figs. 1 and 2. The diagram of Schenectady No. 2 represents results obtained at 200 lbs. pressure as recorded by Dr. Goss in University of Illinois Bulletin No. 26 on High Steam Pressures in Locomotive Service. In order to show the combined effect, if any, of percentage of full load and of speed in

results in which no reference is made to the power developed.

Referring now to the zones of moderate and high speed and especially to the line *AB*, of Schenectady No. 2, it will appear, in the case of simple engines, that full power results in a low water rate. It is clear, however, that maximum or extreme cylinder power may involve sufficient back pressure and other undesirable features of steam distribution to affect economy and that, at maximum cylinder power, a rise similar to *C* in the first diagram but of less importance, may be expected. Were the results of a large number of tests at fair speeds and covering a large range of load percentage available, the location of the 100 per cent. line, or the definition of full power, would be important. Ex-

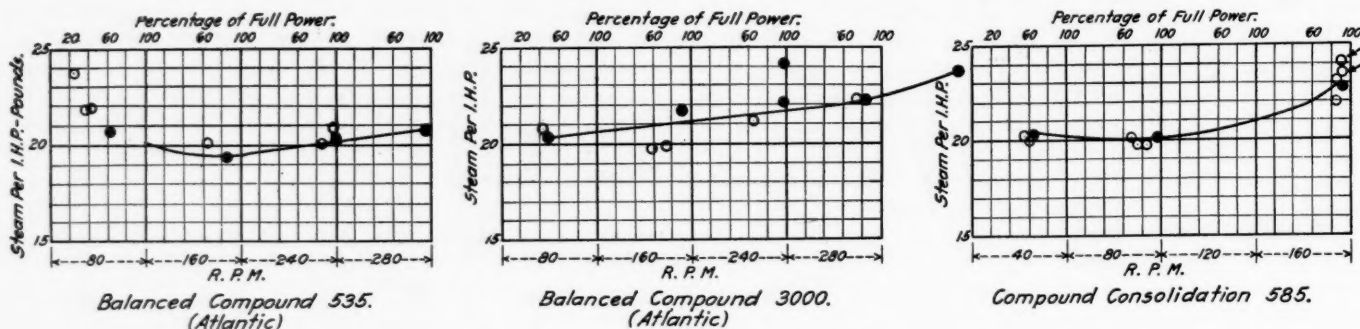


Fig. 2—Steam per I. H. P. for Compound Locomotives.

these diagrams, each speed has assigned to it a vertical zone instead of a single ordinate. Each vertical speed zone is divided by vertical lines representing, as shown by the upper scales of each figure, percentages of full power. Each zone then becomes a diagram showing the water rate on a load base and the combination of several of these into one figure furnishes a speed base for the whole. Thus, in the case of consolidation No. 1499, Fig. 1, the circle *A* represents the result of a test at 51 per cent., and the dot at 64 per cent. of full power. Tests at low power are represented by circles, and tests at high power, or the highest power developed at each speed, by dots.

If, in the low speed zone of this same diagram the tendency

treme cylinder power is disregarded in these diagrams and, assuming that the engines tested were typical as regards boiler and cylinder ratios, the relation of the plotted points to the full power ordinates is based upon full boiler power. It is then clear that at moderate and high speeds we may accept with slight modification the solid dots as representing probable water rates at such maintained power as may be expected with normal ratios of boiler to cylinder power, and it is probable that the variation in water rate due to change in what constitutes full power will be slight. The solid dots representing high power tests of the simple engines are reproduced on Fig. 4 as dots, and the high power tests of compounds are reproduced as circles. Consider-

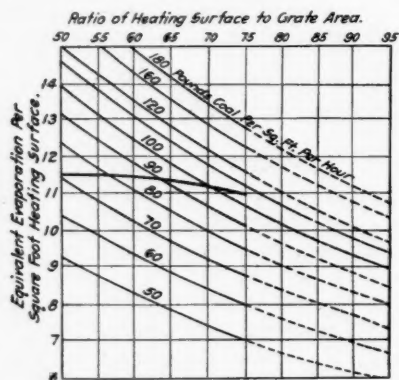


Fig. 3—Evaporation per Pound of Coal Fired.

*AB* in the variation in water rate be produced to an intersection with the 100 per cent., or full load line, a water rate of 26 or 27 lbs. at full power might appear to be indicated. The circle *A* however represents a test at 20 per cent. cut off and the dot a test at 30 per cent. cut off. Similar remarks apply to consolidation No. 734, Fig. 1. As lengthening the cut-off should increase the water rate, it is clear that the curve should turn upward as shown in the first diagram at *C*. The purpose is not, by means of the data shown, to locate this point, but to indicate that the St. Louis tests furnish little data upon which directly to base a water rate curve for slow speeds and long cut-offs and to illustrate the fact that the low speed range of a curve of water rate at full rating, varies in a manner not indicated by a plot of the

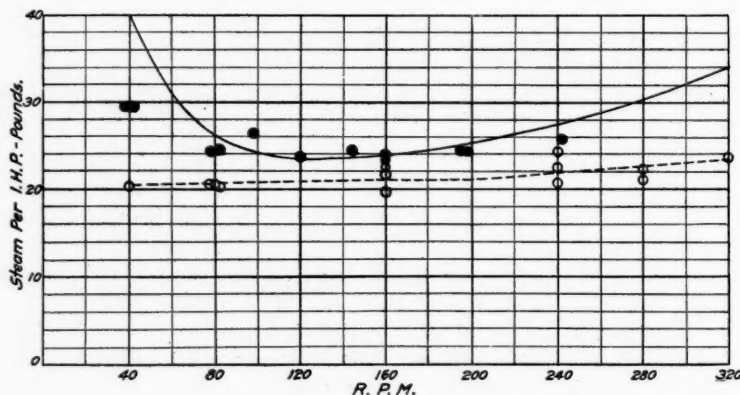


Fig. 4—Comparison of Steam Consumption for Simple and Compound Locomotives.

able uniformity is noticeable, and the water rates at moderate and, to a certain extent, at high speeds are rather well defined. It remains, however, to locate the curve through the low speed ranges, since the dots given for 40 r. p. m. represent but about one half power.

A few tests made at Purdue University, at about 80 per cent. cut-off, 81 r. p. m. and with low boiler pressures, gave water rates which, lowered for steam pressure and raised for speed, correspond with 40 or 41 lbs., at 40 r. p. m. in a modern locomotive. In the report of the St. Louis tests, curves of water rate and cut-off, when extended, indicated a probable water rate of 36.2 at 69 per cent. cut-off and at 40 r. p. m. Again, from a large number of indicator cards taken in road service those were

selected which showed considerable back pressure and wire drawing at cut-off, and a variation between cut-off and speed was derived which represented the road practice of the engineers and the traveling engineer concerned in the tests.

The steam consumption when calculated from the cards, and corrected for moisture by two methods, gave water rates around 38 lbs. at 40 r. p. m., and at other speeds up to 100 r. p. m. gave a curve of water rate closely approximating the solid line, Fig. 4. It may here be remarked that, since the boiler power is seldom the limiting condition at 40 r. p. m., the precise value of the water rate at that speed is of little interest except as indicating the direction of the line and as justifying its curvature through a slightly higher speed range. At high speeds, the curve is elevated as a slight concession to opinions that water rates rise considerably at high speed, all depending of course upon details of design, upon nozzle and back pressure, and other factors which may not be gone into here. Thus the circles of consolidation engines, 1499 and 734, Fig. 1, at 160 r. p. m. represent tests of almost as high power as the dots, and therefore a rising water rate would appear reasonable. Those indicated by arrows, however, were tests in which long cut-offs and throttling resulted in less drawbar pull than shorter cut-offs, and therefore are of less interest than might at first appear. The high speed range of the curve, or, for that matter, both its extremities, may be modified to

**Boiler Power.**—If we average the rates of evaporation obtained at St. Louis in the three highest power tests of each of these locomotives, and divide by the average thermal value of the fuel used in the same tests, the result indicates an actual rate of evaporation for each thousand B. t. u. in the coal, of 0.68 lbs. water per sq. ft. of heating surface. No allowance is here made for various boiler proportions, such as the ratio of heating surface to grate area. An excellent presentation of that subject appeared in the *Proceedings of the American Railway Engineering and Maintenance of Way Association*, February, 1910, from which the evaporation diagram, Fig. 3 (except for the heavy curve) is taken. Thus, with a ratio of heating surface to grate area of 57, corresponding to locomotive 585 (in Fig. 2) and a rate of firing of 81 lbs. on each of its 49.43 sq. ft. of grate per hour, an equivalent evaporation per square foot of heating surface of 11.4 lbs. is indicated. With a smaller grate area, of say 37.5 sq. ft., giving a ratio of 75, this rate of combustion per square foot of grate should give about 9.5 lbs. evaporation. But the report referred to recommends that the strength and ability of the average fireman be recognized by limiting the amount of coal fired to 4,000 lbs. per hour. Trying this on the above-mentioned ratio of 75, this 4,000 lbs. spread over the corresponding area of 37.5 sq. ft. gives a rate of combustion of 107 lbs. represented by the right end of the heavy line. Similarly,

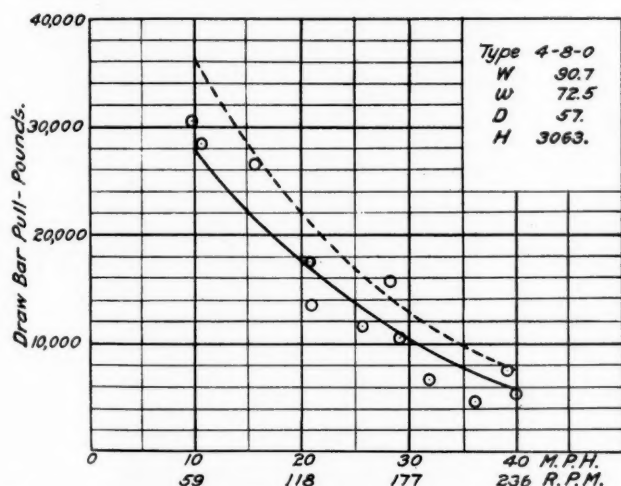


Fig. 5—Actual and Theoretical Drawbar Pull of a 4-8-0 Type Locomotive.

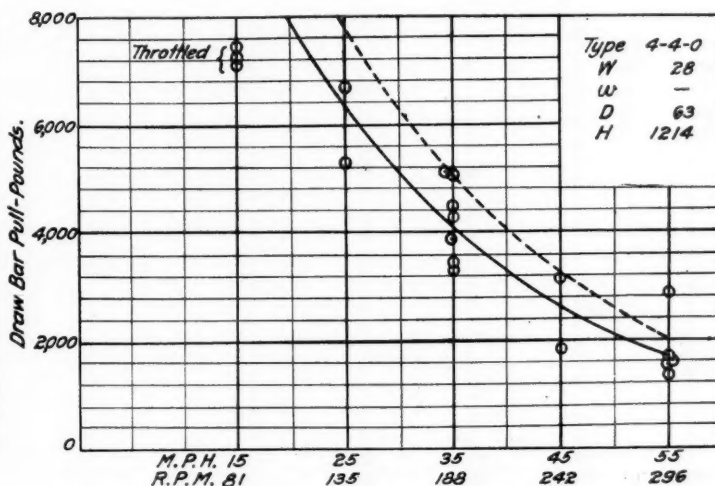


Fig. 6—Actual and Theoretical Drawbar Pull of Purdue Locomotive, Schenectady No. 1.

suit individual beliefs and experience. The empirical equation

$$S = \frac{1500}{R} + .09 R, \text{ in which } S = \text{lbs. of steam per I.H.P. and } R = \text{revolutions per minute, approximates the curve closely.}$$

This being the equation of an hyperbola plus a straight line, it may readily and easily be changed so as to raise the curve at one extremity and reduce it at the other and vice versa. No one curve can possibly represent all opinions, the results of various operating conditions or methods of handling; nor for example, the effects either of special valve gears, valve setting or valve leakage. Therefore, while the curve probably represents normal variations corresponding to good conditions, its general form only is here suggested together with one of various methods of arriving at it or similar curves.

In the case of the compounds whose high power tests are represented in Fig. 4 by circles, the probable rise of the curve at the left, is of less importance; the possible ratios of expansion in compound operation indicate that the rise can be but slight. As we are concerned only with sustained power no attempt is made to represent water rates in temporary simple operation. The rise at the left then, at speeds in which full power was not approached, would but little more than equal the rise at the right and suggests that, in the case of compounds a constant water rate of around 21 or 22 lbs. may be used without material error.

a ratio of 50, or a grate area of 56.4 sq. ft., requiring but 71 lbs. per square foot per hour, gives the left end of the curve, and intermediate points on the heavy line are similarly found. The slope of the line represents loss in economy under high rates of combustion, the same loss that was brought out in tests at Purdue University and reported in Dr. Goss' book on Locomotive Performance. With the somewhat high ratio of 75, an increase in the rate of firing of about 12 per cent. will rectify the line to horizontal, or to a constant rate of evaporation, and with more common ratios, a lesser difference in economy, as 6 per cent. is indicated, a figure insignificant compared with the variables such as endurance of firemen, length of run, weather, and other conditions which enter into the choice of the suggested 4,000 lbs. per hour. The difference in economy is of interest, but that is another matter, than hauling capacity.

We have now considered one phase of the subject. If, however, instead of varying the grate, we vary the boiler, so that the 4,000 lbs. gives a constant rate per square foot of grate surface, the diagram readily suggests some striking changes in evaporation per square foot of heating surface. This discussion then will perhaps indicate when the diagram may and may not be used, or the effect of any definite assumption regarding rates of firing. For example: In recently reported tests of a Norfolk & Western locomotive with 44.7 sq. ft. of grate surface, 4,104 sq. ft. of heating surface, giving a ratio of

91.8, 4,000 lbs. per hour or 88 lbs. per sq. ft., would by the diagram give an evaporation very close to the 8.87 lbs. obtained, although the rate of combustion in the test was 128 lbs. per square foot of grate per hour. In using the diagram, it should be remembered that equivalent and not actual evaporation is shown, and that it is based upon coal of 15,000 B. t. u. In the following illustrations, however, actual evaporation will be based upon the above-mentioned 0.68 lbs. per thousand B. t. u. per lb. of coal. Any such generality assumes that the designer understood the proposed conditions, such as quality of fuel and its effect upon details of boiler design and that boiler proportions are as correct as those of the locomotives whose tests furnish the basis of the figure chosen. It also assumes good condition and proper adjustment of the front end. Any allowance for leakage or the common 10 or 12 per cent. per 1/8 in. scale, must be made with a knowledge of conditions, for even were it possible to introduce all factors into an equation its accuracy would still depend upon original judgment.

**A General Formula for Estimating Tractive Effort.**—If we equate an expression for mechanical horse power at the drawbar to the cylinder horse power (h. p.), and solve for the drawbar pull or tractive effort  $T$  which this cylinder power should give were there no frictional losses, we have the common expression

$$T = \frac{375 \text{ h. p.}}{V} \quad (1)$$

in which  $V$  represents speed in miles per hour. From the preceding discussion, cylinder horse power cannot at any moment exceed the quotient of the rate of actual evaporation  $E$  divided

by the steam per I.H.P.,  $S$ , or  $HP = \frac{E}{S}$ . A suggested value

of  $E$  for sustained operation is  $0.68 BH$  in which  $B$  represents the thermal value of the coal in thousand B. t. u. and  $H$  the heating surface (based upon the fire side of the tubes). Substituting in (1)

$$T = \frac{.68 \times 375 \cdot BH}{VS} = \frac{255 BH}{VS}$$

From this the various resistances are to be deducted. The American Locomotive Company suggests 22.2 lbs. per ton on drivers, as representing the resistance of drivers and connected parts of ordinary locomotives. This may be modified, as for increased friction of grease over oil lubrication; some with experience with Mallet compounds in pusher service may prefer 30 lbs. per ton. If preferred, the refinement proposed by the American Railway Engineering and Maintenance of Way Association,

$$R = 18.7 W + 80 N$$

(in which  $R$  is total resistance of drivers,  $W$  is weight on same in tons, and  $N$  is number of driving axles), may be used. Generally speaking, the two methods give the same results within but a fraction of a load in ordinary rating. As the variations in driver resistance even on a testing plant, as recorded at St. Louis, were enormous; the figure 22 lbs. may as well be used. If preferred, the deduction of machine resistance may be covered by the use of a water rate based upon dynamometer hours power. Thus, the formula for water rate, if written

$$S = \frac{1600}{R} + .12 R, \text{ implies, by comparison with the formula}$$

for steam per I. H. P. an efficiency varying from 92 per cent. at slow speeds to 78 per cent. at 280 r. p. m. A water rate per D. H. P. approximating this may be derived from an examination of the tests mentioned in a manner exactly similar to that used for steam per I. H. P. It is as capable of modification as the

others:— thus  $S = \frac{1600}{R} + .13 R$  implies an efficiency varying between 91 and 73 per cent.

The resistance of the engine and tender trucks may be deducted by means of some such formula as suggested years ago by Dr. Goss,  $W(2 + 1/6V)$  in which  $W$  equals total tons on engine and tender trucks and  $V$  speed in miles per hour. This will be recognized as one of the older train resistance formulae with a deduction for air resistance which, in the case of the

locomotive is separately taken care of by the expression —  
4

For the purpose of estimating, then, we may write for level track

$$T = \frac{255 BH}{SV} - 22 \cdot W - w(2 + 1/6V) - .25V^2,$$

with further deduction for ascending grades, curvature, etc. This may be changed to r. p. m. of the water rate formula may be expressed in terms of miles per hour and inserted in the above by substitution, by the approximate relation  $V = .003 R \times D$ , but it will generally be less confusing to use it in its simpler form for the four or five points necessary to determine the tractive power curve beyond the point at which cylinder power controls.

The circles in Fig. 5 represent the results of dynamometer car tests of the engine whose dimensions\* are given. The thermal

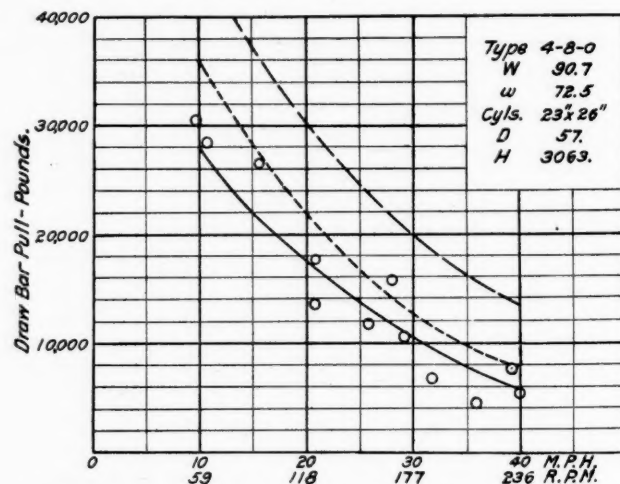


Fig. 7—Drawbar Pull and Tractive Effort Compared.

value of the coal was about 12,000 B. t. u. Every effort was made by all concerned, including the traveling engineer, to obtain good performance. The points represent various high drawbar pulls developed. The figure is taken from both the *Railroad Gazette* of March 7, 1902, and the American Railway Engineering and Maintenance of Way Association report already mentioned. It was selected from among several because it is the largest engine mentioned in those references. With coal of 12,000 B. t. u. the solid line represents continuous performance, and is a plot for this engine of the formula above given. The dotted line represents the possible effect of but one of the operating variables, namely, the use of the injector. It is raised to correspond to the increased temporary boiler power during a drop in water level with the injector shut off. When to this is added other operating variables, including the skill, strength and mood of the fireman, and the consequent variation in the proposed 4,000 lbs. coal per hour, the fact that a single curve cannot agree with all plotted results, nor the latter with themselves, becomes apparent. In order to show the effect of using the same rate of evaporation in the case of a very small boiler, the higher power results obtained at Purdue on Schenectady No. 1 (recorded in *Locomotive Performance*), are plotted in Fig. 6 and also the formula for this engine, omitting air and truck resistance since the results are from laboratory tests.

\* $W$  represents the weight in tons on drivers;  $w$ , the weight in tons of engine and tender minus the weight on drivers;  $D$ , diameter of drivers in inches, and  $H$ , the heating surface in square feet.

In case the reader should refer to the proceedings mentioned, he will notice in the case of Fig. 5, a difference in total heating surface, that given in the proceedings being 3,500 sq. ft. and that given in Fig. 5 being 3,063 sq. ft. The heating surface given in the proceedings was based on the water side of the flues but in the report of the St. Louis tests, from which the recommendations given in the proceedings were derived, calculations and results were based on the fire side. Therefore, in using these results the published 3,500 sq. ft. is here changed to the 3,063 sq. ft. corresponding to the fire side of the flues. The difference is important as it changes the total heating surface of the ordinary locomotive about 14 per cent., which represents approximately the error in calculated tractive effort due to the use of the wrong figure.

Fig. 7 is Fig. 5 reproduced with the addition of a tractive effort curve—the upper line—based upon variable mean effective pressure as expressed by speed factors, deduction having been made for the various resistances. A comparison illustrates the point already mentioned, that the validity of either method depends upon consideration having been given the other. To raise the lower line to the upper necessitates the assumption that with Illinois coal a higher rate of evaporation was maintained than the highest rate reached in any of the tests at St. Louis with coal of nearly 25 per cent. higher thermal value. The zone bounded by the curves represents the difference between sustained and temporary tractive effort. Whether all values suggested be accepted or be slightly modified to conform to individual experience or belief the range of variation which may result from different operating conditions is apparent.

#### TRAIN ACCIDENTS IN FEBRUARY.<sup>1</sup>

Following is a list of the most notable train accidents that occurred on railways of the United States in the month of February, 1912. This record is based on accounts published in local daily newspapers, except in the case of accidents of such magnitude that it seems proper to write to the railway manager for details or for confirmation.

##### Collisions.

Date.	Road.	Place.	Kind of Accident.	Kind of Train.	Kil'd.	Inj'd.
7.	Grand R. & T.....	Cooper.	bc.	F. & F.	1	4
11.	Penn. ....	Primrose.	rc.	F. & F.	1	3
*15.	Grand Trunk .....	N. Yarmouth.	bc.	F. & F.	3	0
16.	Balt. & Ohio.....	Rockwood.	bc.	P. & F.	0	24
*17.	Penn. ....	Larwill.	rc.	P. & F.	4	12
*20.	Boston & Maine.....	Hoosac Tunnel.	rc.	P. & F.	4	0
20.	Penn. ....	Middletown.	xc.	P. & F.	0	7
21.	Chi., B. & Q.....	Lowder.	bc.	P. & F.	1	9

##### Derailements.

Date.	Road.	Place.	Cause of Derailm't.	Kind of Train.	Kil'd.	Inj'd.
4.	Lehigh Valley .....	Flagtown.	unx.	F.	2	1
5.	C. C. C. & St. L.....	Myers.	b. rail.	P.	0	9
5.	Penn. ....	Fort Wayne.	b. rail.	P.	0	3
5.	Southern Pacific.....	Applegate.	unx.	P.	1	0
11.	N. Y. N. H. & H.....	Guilford.	b. rail.	P.	0	0
13.	Great Northern.....	Doyon.	unx.	P.	..	41
15.	Denver & R. G.....	Bingham.	runaway.	F.	5	3
†15.	Penn. ....	Warrior Ridge.	b. truck.	P.	5	66
16.	Lehigh Valley .....	Chitt'go Falls.	b. rail.	P.	0	3
26.	Trinity & B. V.....	Corsicana.	boiler.	F.	1	4
28.	Southern .....	Milstead.	unx.	P.	1	6
29.	Illinois Traction.....	Benld.	unx.	P.	0	14
29.	Chi., R. I. & P.....	Anawan.	unx.	P.	0	3

The collision at North Yarmouth, Me., on the 15th, occurred at 4:30 a. m. An eastbound freight with two engines collided

with a westbound freight, just east of the point where they should have met, the eastbound train having come into the station at uncontrollable speed. The wreck took fire from the engines and 10 cars of grain and merchandise were burnt up. The engineman, fireman, and a brakeman, on the leading engine of the eastbound train, were killed. One of these men was burned to death and another was smothered under a mass of grain.

In the collision at Larwill, Ind., on the 17th, westbound Pennsylvania Limited No. 5, collided with a preceding wrecking train. It was about 5:35 a. m. Four employees were killed and eleven injured, all of whom were on the wrecking train. The wrecking train had been stopped because of a broken rail in the track ahead of it and the workmen were eating breakfast in the commissary car. There was a dense fog at the time and the investigation showed that the passenger train had passed one block signal at caution, two block signals at stop, and the flagman of the standing train. The wooden cars of the wrecking train were burned by fire from the kitchen range. The bodies of two of the killed were slightly burned. The passenger train was largely made up of steel cars and no person on that train was injured. The automatic block signal at the entrance of the block section was about 900 ft. east of the point of collision and the flagman of the standing train was 700 ft. east of his train. He remained on the track swinging his lantern until obliged to step aside to allow the engine to pass. He used neither torpedo nor fusee.

In the rear collision at Hoosac Tunnel, Mass., on the 20th, a passenger train drawn by an electric locomotive ran into the rear of a preceding freight which had been delayed in the Hoosac tunnel near its easterly end. The four men killed were the engineman of the electric locomotive; an apprentice, riding with him to learn the operation of the electric motor; the assistant engineman and a brakeman of the freight train who had gone back to signal the passenger train. The details of the collision were reported in the *Railway Age Gazette*, February 23, page 350, and March 1, page 395. Little additional information has been reported since the publication of our last account. The testimony of the conductor of the freight, who was near the rear end of his train, indicates that all of the men in the cab of the electric locomotive were killed, or at least rendered insensible, by the shock of the collision. The fire did not become serious until somewhere from ten to twenty or thirty minutes after the collision, but the conductor of the freight and the conductor and engineman of the passenger train reached the conclusion that attempts to reach the men in the cab would be useless, and they devoted their chief attention to the safety of the passenger train.

The train derailed at Fort Wayne, Ind., on the 5th, was westbound express No. 15, and the two rear cars in the train were the only ones derailed. One of these was an officer's car, and it fell down a bank. The officer and two porters were slightly injured. The train was running about 35 miles an hour, and the derailment was due to a broken rail.

In the derailment near Doyon, N. D., on the night of the 13th, forty-one persons were injured, many of them only slightly. None were killed. The train was the eastbound Oriental Limited consisting of ten cars, all of which, together with the engine, were derailed, and six fell over on their sides. The cause was not discovered. A loose tire was found on the rear pair of wheels of the engine truck. These wheels had Mansel retaining rings, and all the ring bolts were broken and the tire was about one-third off of the wheel center. The track west of the point of derailment was heaved somewhat by frost, and the train is believed to have been running too fast, causing the engine to roll.

The freight train derailed at Bingham, Utah, on the 15th, was thrown off the track at a sharp curve because of excessive speed while running down a steep grade, and three of the five men killed were sleeping in buildings at the foot of a hill at the side of the track. The locomotive fell down this hill about 75 ft. and crashed through the roof of a bank and a tailor shop. The engineman had lost control of the train some distance back; cause not determined.

<sup>1</sup>Abbreviations and marks used in Accident List:

rc, Rear collision—bc, Butting collision—xc, Other collisions—b, Broken—d, Defective—unf, Unforeseen obstruction—unx, Unexplained—derail, Open derailing switch—ms, Misplaced switch—acc, obst., Accidental obstruction—malice, Malicious obstruction of track, etc.—boiler, Explosion of locomotive on road—fire, Cars burned while running—P, or Pass., Passenger train—F, or Ft. Freight train (including empty engines, work trains, etc.)—Asterisk, Wreck wholly or partly destroyed by fire—Dagger, One or more passengers killed.

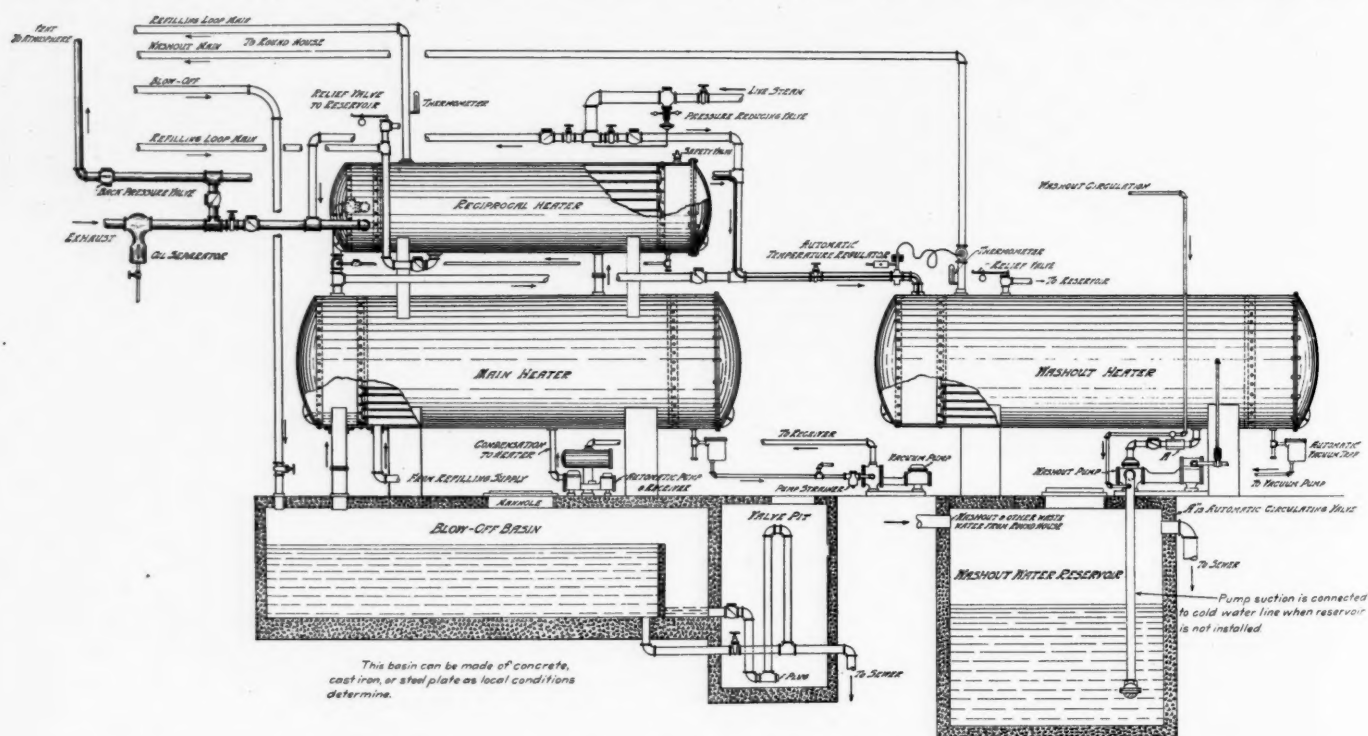
The train derailed at Warrior Ridge, Pa., on the 15th, was the eastbound Pennsylvania Limited No. 2, consisting of two engines, a mail car, a combination baggage and smoking car, two dining cars, three Pullman sleeping cars, and a compartment observation car. The derailment occurred at a switch which had been forced out of position by a piece of the lower arch bar of the truck of the tender of one of the engines which had broken at a point a short distance back of the switch. The engines and the mail car ran a half mile or more beyond the switch, but all of the rest of the cars were derailed and fell down a bank. This derailment was reported in the *Railway Age Gazette* of February 23, page 347. Two passengers and four train employees were killed or fatally injured, and 62 passengers and train employees were injured.

In the accident near Emhouse, Tex., on the 26th, which was caused by the explosion of the boiler of the locomotive, the engineman was killed and the conductor, fireman and one brakeman were injured. The conductor and brakeman were in the caboose, which was being pushed ahead of the engine, having been cut off from the train; and they were injured when the boiler

#### HOT WATER BOILER WASHING AND FILLING SYSTEM.

Hot water washing and filling apparatus for locomotive boilers has recently been installed by the Cowles-Mac Dowell Engineering Company, Chicago, on the Chicago & North Western, the Chicago Great Western, the Bessemer & Lake Erie and several other railways. The system operates on the automatic vacuum principle and with a closed circuit. These important improvements result in the maintenance of a more constant water temperature, increase the saving of coal, and reduce the time required to get up steam. The system insures a constant circulation of blow-off and exhaust steam through the heaters, and provides for delivering all condensation into them. The superior efficiency of the heaters is obtained by the use of the vacuum feature and by making them of the closed type. The blow-off basin, main heater and blow-off main are under a vacuum, and as this reduces the back pressure when blowing off it also reduces the time required for the operation.

The drawing shows the general arrangement of the complete apparatus; its operation is as follows: Blow-off water and



Cowles-MacDowell Hot Water Boiler Washing and Filling System.

of the engine was blown high in the air, dropping on the caboose and crushing its roof. The accident occurred on a trestle. The caboose was derailed, but the engine frame and the tender remained on the track. The caboose took fire from its stove. The caboose, with eleven bents of the trestle were destroyed by fire. The accident occurred at 1:35 a. m. The explosion was due to low water.

**Electric Accidents.**—Of the half dozen electric car accidents reported in the newspapers as occurring in the United States in the month of March, only one was reported as having been attended with fatal results. This was a derailment near McKeesport, Pa., on the 6th, where five passengers were killed and 15 were injured. A car which became uncontrollable on a descending grade rolled down a bank about 100 ft. The accident occurred three miles from the nearest town, and one mile from the nearest telephone, and the injured persons suffered severely from the cold while waiting for assistance.

The Bahia Minas Railroad, Brazil, has been granted a concession to build a branch from any convenient point on its line to Conquista City.

steam pass first into the blow-off basin. From this basin the steam passes to the first end compartment of the main heater, then through the tubes to the opposite end. Condensation, resulting from the steam imparting its heat to the refilling water surrounding the tubes, is discharged into the main heater, where it adds to the quantity of the refilling water. Clean water for refilling is taken from the railway company's supply and is passed through the main heater, where its temperature is raised by the blow-off steam; thence to the reciprocal heater, where its temperature is raised to 180 deg. and above; from there it goes to the engine house. The heat for raising the temperature of the refilling water in the reciprocal heater is taken from the exhaust steam principally, supplemented by the surplus blow-off steam and by live steam at times when there is a deficiency of waste steam. Steam enters one end compartment of the reciprocal heater, passes through the tubes and imparts its heat to the refilling water surrounding the tubes and is condensed and discharges into the other end compartment of the reciprocal heater; from there it is conveyed to the main heater, adding an additional amount to the quantity and heat of the refilling water. From the end of the refilling line there is a return line to the reciprocal

heater which completes the loop for circulation; or, when a separate refilling pump is installed, circulation is maintained through the automatic circulating valve on the pump.

Blow-off products are held in the blow-off basin, where heat is extracted under a vacuum in the form of a vapor which passes into the main heater, as described above, after which the muddy water passes to the sewer through the siphon in the valve pit. The sludge can be washed to the sewer through a sludge pipe in the bottom of the basin, or removed through the manhole. The siphon seals the basin and insures a vacuum therein, and it discharges the dirty water to the sewer.

The washout pump takes its supply from the washout reservoir and passes it through its heater, where the temperature is raised by the heat from exhaust steam, surplus blow-off steam and live steam which circulate through the tubes in the heater. Live steam is used only when there is a deficiency in the other heat supplies. The temperature of the washout water is maintained at about 130 deg. by means of a Sylphon temperature regulator. Circulation is maintained through the automatic circulating valve on the pump. The water used for washing out returns to the washout reservoir. The vacuum pump maintains a vacuum in the tubes and end chambers of the washout heater which insures efficient circulation of steam through them. The condensation from the washout heater is discharged into the main heater.

The vacuum pump maintains a vacuum in the end compartments and tubes of the main heater, the blow-off basin, and the blow-off main to the valves on the lower ends of the post drops. While the vacuum in the blow-off main is destroyed when engines blow-off, the back pressure against the blow-off steam and water is practically destroyed by the counter effect of the vacuum, thus insuring material reduction in the time of blowing off, particularly at the later end when the steam pressure is low. The vacuum causes blow-off steam to pass into the heaters. The vacuum pump discharges all condensation into an automatic pump and receiver, which discharges into the main heater. The pumps are controlled by governors in the usual way. The heaters are built for 135 lb. working pressure. The plant is practically automatic in operation and constitutes a continuous feed water heating system.

#### THE EVERLASTING BLOW-OFF VALVE.

The Everlasting blow-off valve is designed for the severest conditions of blow-off service on locomotives, and differs from others now on the market in several important particulars. The boiler pressure is the only means used to keep it tight, and, as the valve disk never leaves the face of the valve, but is tightly pressed thereto, it is impossible for scale or sediment to get between them and thereby cause leakage, which is the common defect of blow-off valves. Another good point in this valve is the construction of the case, which is made in halves and bolted together. This is more expensive than the solid case used in most other valves, but the accessibility for repairs and inspection attained by this feature is a strong point of merit.

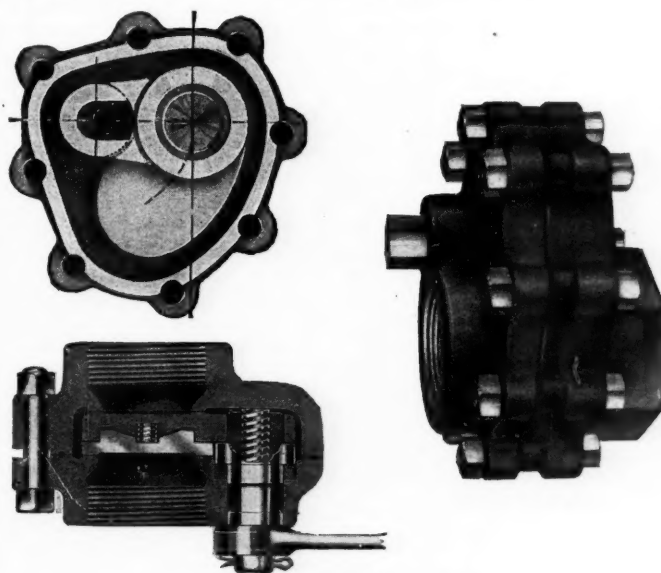
By unbolting the two bonnets the whole working mechanism of the valve can be taken out without the use of hand tools, and the faces may be re-surfaced in ten or fifteen minutes and made as good as new. The valve face is chilled and ground, and the disk is made of the very hardest nickel bronze, giving a remarkable wearing quality to these surfaces.

This valve has no stuffing box, and it will be seen that the mechanism is arranged on very much closer centers than would be possible if the stuffing box were used. A much smoother pull is thus secured, and this materially reduces the effort required to open and close the valve.

The inlet orifice is made tapered and slightly smaller than the opening in the valve face; that is, it is "choke bored." As these openings are eccentric and very close together, the greater part of the solid matter which is carried out with the blow-off enters

the discharge pipe without impinging upon the valve face at all. This relieves the face from much of the wear it would otherwise have. By this means also there is obtained a syphoning action which cleans the valve at each operation. The valve is simple, compact, very strong and very rarely requires repairs. A large experience with these valves shows that they are practically self-grinding, as the disk revolves when being operated. The instructions state that the valves should be operated frequently, at least once a day, as this tends to keep them in good condition and is beneficial in helping to clean the boiler.

The 1½ in., 2 in., 2½ in. and 3 in. sizes will stand 150 lbs. hydrostatic pressure, and each valve is tested with 250 lbs. steam



Everlasting Blow-Off Valve.

pressure before leaving the factory. The Central of Georgia has used the Everlasting valve as standard for three or four years. All engines on that line are equipped with four such valves, as the water in that region requires frequent blowing off. The same valve is used throughout the engine house at Macon, Ga., in connection with the hot water washing system, and is found very satisfactory for this purpose. It has been used for some time with good results by the Chesapeake & Ohio, and all the new locomotives of the Chicago & North Western are equipped with it. The valve is made by the Scully Steel & Iron Company, Chicago.

Some interesting figures on the progress of the railways in Rhodesia are given in the recent report of the British South Africa Company, which has large interests in the Rhodesia, Mashonaland and Beira Railways. The marked improvement of 1910 in traffic reports of these railways continued during 1911. In 1910 the gross receipts were \$6,781,445, and the net receipts \$3,504,810, whereas in 1911 the gross receipts increased to \$8,677,850, and the net receipts to \$4,773,325. Improvement during 1911 was due to the growth in general traffic, apart from the transportation of construction material, although some of that traffic is still passing over the Rhodesian system for the extension in the Congo state of the Katanga company's railway from Elizabethville to Kambove. Today the management of the railways in Rhodesia is concerned less with the absence of traffic than with the means of dealing with traffic already existing and future developments, and also with the adjustment of rates. The principle on which the management is proceeding is not by way of class reductions, which, being wholesale, would be discriminating, but by a careful study of the individual articles. In the last four years reductions have been made on a large number of agricultural products as well as on fencing materials, etc. The rates on timber, scrap iron, etc., have also been reduced.

## General News Section.

The St. Louis & San Francisco has announced that it will establish a gasoline electric motor car service between Dallas, Tex., and Sherman.

Press despatches from Corinth, Miss., March 20, report the robbery of train No. 4, on the Mobile & Ohio, near that place, in which it is said that the express car was rifled of valuables aggregating \$30,000.

A bill has been introduced in Congress to amend the Erdman act providing for governmental mediation between railways and dissatisfied employees, so that its provisions shall apply to coal mine owners and employees.

The Grand Trunk has increased the pay of telegraphers throughout its lines, making overtime pay for Sunday work the rule everywhere. This will increase the monthly income of a large percentage of the operators.

The proposed meeting of representatives of the mechanical department crafts of the western railways for the purpose of organizing a federation, including employees of all the roads, which was to have been held at Kansas City on March 4, has been postponed, and it is now reported that the meeting will be held on April 15.

The Pennsylvania Railroad reports that in the year 1911 over 500,000 efficiency tests were made and the employees have a record of 99.7 per cent. perfect. As a record of observance of fixed signals this percentage has no value, as the tests cover other subjects, such as conformity to speed regulations, leaving or arriving ahead of time, car doors not properly closed, and other things.

The secretary of the interior, who has just visited the Panama canal, has laid before President Taft a detailed plan for the use of men and equipment from Panama, when certain work on the canal shall have been finished, for the construction of a railway in Alaska. President Taft recently recommended to Congress that the government should undertake the construction of a railway to certain Alaskan coal fields.

The *Santa Fe Employees' Magazine* publishes the record of an Atchison, Topeka & Santa Fe locomotive, No. 1443, that covered 269,899 miles, still carrying its original boiler tubes, between June 13, 1907, when it was received from the Baldwin Locomotive Works, and December 8, 1911, when it was received at the Topeka shops for heavy repairs, with a total outlay for repairs of less than \$2,000. The locomotive is an Atlantic type balanced compound passenger engine, and has been in service on the Middle, Southern Kansas and Oklahoma divisions.

Senator Richard Fitzherbert, of Morris County, New Jersey, who was the subject of an investigation on charges of conduct inconsistent with the duty of a senator, still retains his seat, the advocates of expulsion failing to secure the two-thirds' vote, which is necessary to expel a member. The 11 republicans voted for the expulsion of Senator Fitzherbert, and the 7 democrats voted the other way. The connection of Senator Fitzherbert with a bill to forbid the use of acetylene in the lighting of cars in New Jersey, was reported in the *Railway Age Gazette* of February 23, page 326.

A bill has been introduced in the legislature of New York embodying in a modified form the reciprocal demurrage rule which is in force in a number of other states. The bill stipulates that when a car is not furnished to a shipper within the "free time" prescribed in the demurrage rules of the company, the intending shipper shall have a claim equal to the usual demurrage charge for the same number of days. The bill says that no demurrage charges shall be imposed for delay in unloading except by impartial rules and regulations, previously adopted; and these rules must be printed on the bill presented to the consignee.

The announcement that the trains of the Lehigh Valley will cease to use the Pennsylvania terminal at Jersey City on the first of next August, is now followed by the statement that about

that time, or as soon as the new station at Summit avenue, Jersey City, shall have been finished, the historic terminal will be abandoned as a passenger station. Summit avenue is two miles from the terminus at the ferry, and this is to be the only passenger station of the Pennsylvania in Jersey City. This station is just west of the point where the tunnel trains of the Hudson & Manhattan emerge from the tunnel and continue westward over the Pennsylvania tracks to Newark. Passengers to and from that part of Jersey City adjacent to the old terminal can avail themselves of the tunnel trains between that point and either Summit avenue or Manhattan transfer.

The broken rail, which was said to have caused the derailment at Hyde Park, N. Y., March 13, was found to have been broken into at least eight pieces. It was a 33-ft. rail. Seven pieces have been recovered. About three feet is missing. This may have been carried into the river. In those parts which were found the breaks were all clean and new showing no fault in the metal. The inspector of the Interstate Commerce Commission proposes to have a piece examined and analyzed at the Bureau of Standards, in Washington, and the New York State Public Service Commission has asked for a piece to be examined and analyzed at the laboratory of the mill where the rail was made (Buffalo). Officers of the road have been unable to decide whether the failure of the rail caused the derailment or was caused by it.

At a recent union meeting of district representatives of the Brotherhood of Locomotive Engineers, Brotherhood of Railway Trainmen, Brotherhood of Locomotive Firemen and Order of Railway Conductors, at Springfield, Ill., it was resolved "that we go on record as opposed to the drastic and unnecessary laws that are being pushed by shippers and manufacturing associations in many states tending to drain the resources of the railways and reduce their operating revenues, believing as we do that the theory of a square deal should apply to so great an industry as the transportation of the world's products. The constantly increasing demands of the public for safer and better facilities in transportation, and the installation of modern safety appliances for the protection of railway employees render it necessary that a more liberal attitude should obtain on the part of public officials, and those having to do with the making of laws."

### Disastrous Boiler Explosion at San Antonio.

At the shops of the Southern Pacific in San Antonio, Tex., last Monday one of the company's largest locomotives, nearly new, was wrecked by the explosion of its boiler, and 32 men were killed. The engine stood at a point in the yard where it was nearly surrounded by three buildings, and most of the persons killed were in these buildings. Some of them were crushed by parts of the buildings which fell in consequence of the explosion. Fifty or more persons were injured. Most of these shopmen were from northern and eastern cities, having been employed at San Antonio only since the strike which occurred there a few weeks ago.

### The Coal Strikers.

The strike of coal miners in England continues with little change from the condition reported a week ago, although it is said now that the number of employees of factories, railways, etc., who have been made idle by the cessation of work at the coal mines, is increased to 1,500,000. The principal news of the past week has been that relating to the action of Parliament. On Tuesday the government introduced a bill to establish minimum rates of wages in the mines, but there is much difference of opinion as to the merit of the proposal, and the government itself seems to be undecided regarding many features of the problem. The bill divides the country into 21 districts and provides for the establishment in each of a reasonable minimum rate of wages, with safeguards for the owners of the mines, the whole to be arranged by district boards. The bill has little of compulsion, and it is declared to be a temporary measure, intended

to be abolished or modified after the present disagreement shall have been settled.

The strike of coal miners in Germany appears to have failed, and the reports indicate that most of the men went back to work this week. On Monday there was a strike of coal miners in the district of Denain, France, where 7,000 of the 13,000 miners left their work.

The committee of anthracite miners, who met the operators in New York City last week, rejected all of the proposals made by the operators, and it is intimated that the miners will be ordered to strike on the first of April. President Taft has had numerous conferences with representatives of the operators, and has invited John Mitchell to confer with him on the subject.

#### Value of Harriman Estate.

The final appraisal of the estate of E. H. Harriman is about completed, and it is estimated that the estate will be valued at in the neighborhood of \$100,000,000. The transfer tax of the state of New York will amount to about \$1,000,000. Of this transfer tax, which is the largest single tax on the transfer of an estate that has ever been made in New York, between \$700,000 and \$800,000 has already been paid to the state.

#### Possibly Prejudiced.

Mr. Rockefeller and all the old crowd who were brought up in the oil refining business can never reconcile themselves to the idea of using oil as a locomotive fuel. To them, oil is too valuable a product to be fed into the maw of a hungry locomotive. They think of the big money in the refined oil and its by-products. Of course, they know that 50 per cent. of the oil produced in California is unsuitable for refining, but it hurts them nevertheless to see it burned up like coal or used to improve the condition of country roads.—*Exchange*.

#### Railway Monopoly.

"What do you think of the suggestion that no corporation be permitted to have more than fifty per cent. of a given business?"

"I think it would be more feasible to provide that not more than fifty per cent. of any legislative body should consist of lawyers. The Anti-Trust Law, as it stands, covers this feature sufficiently, and the experience of the railways illuminates the problem. Transportation is the biggest industry in the United States, but it is not a monopoly, as it is in France, nor are amalgamations encouraged, as they are in England. Here, largely by the operation of the Anti-Trust Law, it is divided into great competitive units. For example, the Chicago & Northwestern is competing all the time with the Chicago, Milwaukee & St. Paul, in service, and in efforts to develop a large section. The Union Pacific, the Burlington, the Rock Island, the Santa Fé, and the Missouri Pacific are competitive. The Southern Railway, the Atlantic Coast Line, and the Seaboard Air Line are competitive in another large territory, and so on through the whole country. Doubtless tens of millions of dollars could be saved if the French method could be applied by parceling out the country into districts and giving one company the business of a district without competition. Much wasteful service could be eliminated, traffic could be sent over the lines of least resistance, and the consequent savings could be divided between producer, consumer, and wage-worker. It would all be a question of administration. Under proficient executives and with political wisdom it might work splendidly, but under other conditions fall into dry rot. The Anti-Trust Law preserves the advantages of competition, which, after all, is not obsolete. The competitive *instinct* has not been repealed in football, or among politicians, or in industry.—*Frank Trumbull; Interview in The Outlook*.

#### Educational Bureau for the Central of Georgia.

W. G. Winburn, vice-president of the Central of Georgia, has issued a circular announcing the establishment of an educational bureau as recently noticed in the *Railway Age Gazette*. It is to be under the charge of D. C. Buell, who continues chief of the educational bureaus of the Union Pacific and Illinois Central. The first instruction papers for the Central of Georgia will be issued on April 1. The system will be an adoption of that established on the Union Pacific and then extended to the Illinois Central. A local office will be located at Savannah, Ga., to handle

lesson papers and correspondence with students, while the text book work will be done at the Union Pacific headquarters at Omaha. Mr. Buell has just finished a trip over the road for the purpose of arranging the necessary changes in the text books and lessons to bring them into accord with the Central of Georgia conditions and standards. He found that little revision was required and that the instructions may be adapted to the needs of each road at a minimum expense.

#### State Authorities Promise Action to Reduce Trespassing.

The letter written by President Darius Miller of the Chicago, Burlington & Quincy to the governors of the thirteen states traversed by the Burlington lines, asking the co-operation of the state authorities in securing the enactment and enforcement of laws to prevent trespassing on railways, has elicited a ready response, with many promises that the subject shall receive careful consideration. Mr. Miller's letter, in which he showed that over half of the people killed annually by the railways are trespassers, was published in our issue for March 1, page 441.

Governor Shafroth, of Colorado, expressed approval of the endeavor to bring about a reduction in the number of railway casualties by preventing trespassing and requested Mr. Miller to submit a draft of a suitable law.

Governor McGovern, of Wisconsin, wrote that the subject is an important one but not a simple one for the legislators. He said he had called the attention of the State Railway Commission to it, and that he would give the subject his personal attention.

Governor McDonald, of New Mexico, wrote that the subject will be given careful consideration.

Governor Carey, of Wyoming, wrote: "I am heartily in accord with what you propose in the way of legislation to protect railways from trespassers and to protect those who trespass."

Governor Colquitt, of Texas, replied that he had referred Mr. Miller's letter to the chairman of the railway commission; and several others replied similarly.

Secretary Kilpatrick, of the Illinois Railway Commission, replied to Mr. Miller's letter saying that the subject of trespassing has engaged the attention of the Illinois commission and of the North Central Association of Railway Commissioners, and that "something ought to be done to prevent these casualties."

George Rice, chairman of the South Dakota commission, wrote: "The commission has already given the subject some consideration and in its next report to the governor will make some recommendations."

E. H. Hogueland, secretary of the Kansas commission, said in his letter that the subject had never received proper attention at the hands of the legislative bodies and that the Kansas commission will be glad to recommend to the state legislature any appropriate legislation on the subject.

T. M. Bradbury, secretary of the Missouri commission, said he believed that commission is in full accord with Mr. Miller's suggestions and will endeavor to have the matter considered at the next session of the legislature.

Chester M. Dawes, general counsel of the Burlington, is preparing a draft of a proposed bill to prohibit trespassing.

#### Agreement for Joint Ownership of the Belt Railway of Chicago.

A most important improvement in the methods of interchanging through freight between the various railways in the Chicago terminal district is expected to result from an agreement which has been reached by fourteen of the principal roads entering the city providing for the joint ownership and operation of the Belt Railway of Chicago, which operates under lease what is known as the Belt division of the Chicago & Western Indiana Railway, an inner belt line encircling the city from South Chicago to Cragin, a distance of 22 miles, intersecting all roads entering the city.

All of the roads entering the city have been invited to join in the plan by becoming joint stockholders of the Belt Company, and others in addition to those who have already done so are expected to become parties to the agreement. The list at present includes the Chicago, Rock Island & Pacific, the Illinois Central, including the Chicago, Madison & Northern, the Pennsylvania Lines, the Chicago, Burlington & Quincy, the Chicago & Alton, the Minneapolis, St. Paul & Sault Ste. Marie, the Atchison, Topeka & Santa Fe, the Chesapeake & Ohio, the Grand

Trunk, the Wabash, the Erie, the Chicago, Indianapolis & Louisville and the Chicago & Eastern Illinois. Of these the latter seven now use in part the terminal facilities of the Chicago & Western Indiana.

The agreement provides that the Chicago & Western Indiana shall purchase for \$4,400,000 the property of the Chicago Union Transfer Railway, including the Clearing yard, a modern hump classification yard, with a capacity of 5,000 cars a day, situated in the southwestern part of the city, and shall construct when required an auxiliary clearing yard at or near South Chicago, in addition to the eight yards which are now operated by the Belt. The Western Indiana will also construct and elevate two additional main tracks between Seventy-sixth street and Pullman Junction, where it now has four tracks, to be leased to and operated by the Belt. The plan also provides for the construction eventually of additional trackage and yards as required to avoid all grade crossings and enable a thorough reorganization of the present methods of transferring freight. The Western Indiana will lease the Clearing yards and additional main tracks to the Belt company for 50 years in the same manner as its Belt division is now leased to the Belt company and at a rental equal to the interest on the bonds to be issued in payment, and for the cost of all additions and improvements to be made hereafter. The existing leases of the Western Indiana to the Belt company are to be readjusted so that the rentals shall be equal to the interest at  $4\frac{1}{2}$  per cent. on \$14,000,000, which is assumed to be the value of the Belt division in its present condition. During the year 1911 the net earnings of the Belt were sufficient to pay  $4\frac{1}{2}$  per cent. interest on \$23,000,000.

The Belt company is to increase its stock from \$1,200,000 to at least \$4,000,000, and to sell the additional stock to the railway companies at par for cash (\$240,000 to each), and each company holding stock in the Belt will be entitled to have one director in the Belt company. The latter will grant to each of the stockholding companies the right to use its main lines between Cragin and South Chicago, and between Argo and Elsdon for interchange of freight traffic with other railways and to and from each of the clearing yards and will itself maintain and operate the property. All working expenses, including rentals to the Western Indiana company and dividends of not less than 6 per cent. on the stock of the Belt company, are to be paid by the stockholding companies on a per car basis of property used in common.

The Belt company will maintain and operate an L. C. L. clearing house at Clearing for the joint use of all of its tenant companies, and will classify and interchange cars at the Clearing yards at an equal price per car for its stockholders which may reach the yards by any line. It will continue to switch cars as at present and to do local and industrial switching on its lines for all companies in Chicago at tariff rates and any profits from such switching will be credited to the rentals and expenses of the Belt company.

The Belt company is to have the option to purchase the property used by it at the end of 50 years on payment of the principal sum on which it shall then be paying interest rentals.

What is probably the most important feature of the plan is that it will remove a large amount of interchange from the congested downtown terminals to the outer clearing yards. Transfers of through freight from east to west and west to east and west to south will be made in the yards at Clearing, which now have a capacity of 5,000 cars a day and occupy but one-fourth of the property to be purchased from the Chicago Union Transfer Company. Therefore, the plan provides for an expansion of the yards to a capacity of 20,000 a day, or twice the volume of the present transfer business of the city. The proposed new yard at South Chicago will be designed to handle transfers between east and south, but will not be required at present, because the Belt now has three yards just north of Ninety-fifth street in that vicinity, the Burnside, Stony Island and South Chicago yards.

Several other roads which have not become parties to the agreement to become stockholders of the Belt are connected with the Clearing yard through the Indiana Harbor Belt, which connects with the yard on the west, while the Belt Line connects with it on the east. The Indiana Harbor provides an outer belt line supplementing the inner belt line. The entire plan also has an important bearing on the plans of the city and of the federal government authorities for the improvement of harbor

facilities in and near Chicago which have not yet been definitely determined. From sixty to ninety days will be required to carry out the legal formalities incident to the plan, which represents the culmination of nearly 20 years of effort to effect a plan of joint ownership of the Belt property. Negotiations with the representatives which led to the adoption of the plan have been carried out by W. H. Lyford, general counsel of the Chicago & Eastern Illinois, acting as counsel for the reorganization committee of the Belt company.

#### Accident Record—Correction.

An officer of the Grand Rapids & Indiana informs us that the item in our January accident record (March 1, page 387), showing a collision on that road on the 24th, is unfounded. No accident occurred on that road on the day named, nor was there any accident in January in which two persons were killed.

#### Railway Club at University of Illinois.

About 40 students of the University of Illinois, pursuing courses in railway engineering or railway administration, have joined in forming the Railway Club of the University of Illinois. The object of the club is to provide for informal meetings for a discussion of railway problems and to promote good fellowship among its members.

#### Western Railway Club.

At the regular monthly meeting of the Western Railway Club, which was held in the Karpen building, on Tuesday evening, March 19, Dr. P. H. Conradson, chief chemist of the Galena-Signal Oil Company, Franklin, Pa., presented a paper on Lubrication of Steam Engines. Practical demonstrations of the lubrication of superheater engines were made at the meeting.

#### MEETINGS AND CONVENTIONS.

*The following list gives names of secretaries, dates of next or regular meetings, and places of meeting.*

- AIR BRAKE ASSOCIATION.—F. M. Nellis, 53 State St., Boston, Mass.; annual, May 7-10, Richmond, Va.
- AMERICAN ASSOCIATION OF DEMURRAGE OFFICERS.—A. G. Thomason, Boston, Mass.; annual, May 10-11, San Francisco, Cal.
- AMERICAN ASSOCIATION OF GENERAL PASSENGER AND TICKET AGENTS.—W. C. Hope, New York; next convention, Seattle, Wash.
- AMERICAN ASSOCIATION OF FREIGHT AGENTS.—R. O. Wells, East St. Louis, Ill.; annual, June 18-21, Detroit, Mich.
- AMERICAN ASSOCIATION OF RAILROAD SUPERINTENDENTS.—O. G. Fetter, Carew building, Cincinnati, Ohio; 3d Friday of March and Sept.
- AMERICAN ELECTRIC RAILWAY ASSOCIATION.—H. C. Donecker, 29 W. 39th St., New York. Convention, October 7-11, Chicago.
- AMERICAN ELECTRICAL RAILWAY MANUFACTURERS' ASSOC.—George Keegan, 165 Broadway, New York. Meetings with Am. Elec. Ry. Assoc.
- AMERICAN RAILWAY ASSOCIATION.—W. F. Allen, 75 Church St., New York. Next session, May 15, New York.
- AMERICAN RAILWAY BRIDGE AND BUILDING ASSOCIATION.—C. A. Lichty, C. & N. W., Chicago. Convention, 3d week in Oct., Baltimore, Md.
- AMERICAN RAILWAY ENGINEERING ASSOCIATION.—E. H. Fritch, Monadnock Block, Chicago.
- AMERICAN RAILWAY MASTER MECHANICS' ASSOC.—J. W. Taylor, Old Colony building, Chicago. Convention, June 17-19, Atlantic City, N. J.
- AMERICAN RAILWAY TOOL FOREMEN'S ASSOCIATION.—M. H. Bray, N. Y. N. H. & H., New Haven, Conn. Convention, July 9, Chicago.
- AMERICAN SOCIETY FOR TESTING MATERIALS.—Prof. E. Marburg, University of Pennsylvania, Philadelphia, Pa. Annual, March 28-29, New York.
- AMERICAN SOCIETY OF CIVIL ENGINEERS.—C. W. Hunt, 220 W. 57th St., New York; 1st and 3d Wed., except June and August, New York.
- AMERICAN SOCIETY OF ENGINEERING CONTRACTORS.—J. R. Wemlinger, 13 Park Row, New York; 2d Tuesday of each month, New York.
- AMERICAN SOCIETY OF MECHANICAL ENGINEERS.—Calvin W. Rice, 29 W. 39th St., New York.
- AMERICAN WOOD PRESERVERS' ASSOCIATION.—F. J. Angier, B. & O., Baltimore, Md. Convention, 3d week in January, 1913, Chicago.
- ASSOCIATION OF AMERICAN RAILWAY ACCOUNTING OFFICERS.—C. G. Phillips, 143 Dearborn St., Chicago; annual, June 26, 1912, Quebec, Que.
- ASSOCIATION OF RAILWAY CLAIM AGENTS.—J. R. McSherry, C. & E. I., Chicago; annual convention, May 22, 1912, Los Angeles, Cal.
- ASSOCIATION OF RAILWAY ELECTRICAL ENGINEERS.—Jos. A. Andreucetti, C. & N. W. Ry., Chicago. Semi-annual, June 11, Atlantic City, N. J.; annual, October 21-25, Chicago.
- ASSOCIATION OF RAILWAY TELEGRAPH SUPERINTENDENTS.—P. W. Drew, 135 Adams St., Chicago; annual, June 24, 1912, New York.
- ASSOCIATION OF TRANSPORTATION AND CAC ACCOUNTING OFFICERS.—G. P. Conrad, 75 Church St., New York. Convention, Oct. 7-11, Chicago.
- CANADIAN RAILWAY CLUB.—James Powell, Grand Trunk Ry., Montreal, Que.; 2d Tuesday in month, except June, July and Aug., Montreal.

## Traffic News.

CANADIAN SOCIETY OF CIVIL ENGINEERS.—Clement H. McLeod, 413 Dorchester St., Montreal, Que.; Thursdays, Montreal.

CAR FOREMEN'S ASSOCIATION OF CHICAGO.—Aaron Kline, 841 North 50th Court, Chicago; 2d Monday in month, Chicago.

CENTRAL RAILWAY CLUB.—H. D. Vought, 95 Liberty St., New York; 2d Thurs. in Jan. and 2d Fri. in March, May, Sept., Nov., Buffalo, N. Y.

CIVIL ENGINEERS' SOCIETY OF ST. PAUL.—L. S. Pomeroy, Old State Capitol building, St. Paul, Minn.; 2d Monday, except June, July, August and September, St. Paul.

ENGINEERS' SOCIETY OF PENNSYLVANIA.—E. R. Dasher, Box 704, Harrisburg, Pa.; 1st Monday after 2d Saturday, Harrisburg, Pa.

ENGINEERS' SOCIETY OF WESTERN PENNSYLVANIA.—E. K. Hiles, 803 Fulton building, Pittsburgh; 1st and 3d Tuesday, Pittsburgh, Pa.

FREIGHT CLAIM ASSOCIATION.—Warren P. Taylor, Richmond, Va.; annual, May 15, Buffalo, N. Y.

GENERAL SUPERINTENDENTS' ASSOCIATION OF CHICAGO.—E. S. Koller, 226 W. Adams St., Chicago; Wed. preceding 3d Thurs., Chicago.

INTERNATIONAL RAILWAY CONGRESS.—Executive Committee, rue de Louvain, 11 Brussels; 1915, Berlin.

INTERNATIONAL RAILWAY FUEL ASSOCIATION.—D. B. Sebastian, La Salle St. Station, Chicago. Convention, May 22-25, Chicago.

INTERNATIONAL RAILWAY GENERAL FOREMEN'S ASSOCIATION.—L. H. Bryan, Brown Marx building, Birmingham, Ala. Convention, July 23-26, Chicago.

INTERNATIONAL RAILROAD MASTER BLACKSMITHS' ASSOCIATION.—A. L. Woodworth, Lima, Ohio. Convention, August 15, Chicago.

MASTER BOILER MAKERS' ASSOCIATION.—Harry D. Vought, 95 Liberty St., New York; annual convention, May 14-17, Pittsburgh, Pa.

MASTER CAR BUILDERS' ASSOCIATION.—J. W. Taylor, Old Colony building, Chicago. Annual convention, June 12-14, Atlantic City, N. J.

MASTER CAR AND LOCOMOTIVE PAINTERS' ASSOC. OF U. S. AND CANADA.—A. P. Dane, B. & M., Reading, Mass. Convention, September, 10-13, Denver, Col.

NATIONAL RAILWAY APPLIANCES ASSOC.—Bruce V. Crandall, 537 So. Dearborn St., Chicago. Meetings with Am. Ry. Eng. Assoc.

NEW ENGLAND RAILROAD CLUB.—G. H. Frazier, 10 Oliver St., Boston, Mass.; 2d Tuesday in month, except June, July, Aug. and Sept., Boston.

NEW YORK RAILROAD CLUB.—H. D. Vought, 95 Liberty St., New York; 3d Friday in month, except June, July and August, New York.

NORTHERN RAILROAD CLUB.—C. L. Kennedy, C. M. & St. P., Duluth, Minn.; 4th Saturday, Duluth.

OMAHA RAILWAY CLUB.—H. H. Maulick, Barker Block, Omaha, Neb.; second Wednesday.

PEORIA ASSOCIATION OF RAILROAD OFFICERS.—M. W. Rotchford, Union Station, Peoria, Ill.; 2d Tuesday.

RAILROAD CLUB OF KANSAS CITY.—C. Manlove, 1008 Walnut St., Kansas City, Mo.; 3d Friday in month, Kansas City.

RAILWAY BUSINESS ASSOCIATION.—Frank W. Noxon, 2 Rector St., New York.

RAILWAY CLUB OF PITTSBURGH.—J. B. Anderson, Penna. R. R., Pittsburgh, Pa.; 4th Friday in month, except June, July and August, Pittsburgh.

RAILWAY ELECTRICAL SUPPLY MANUFACTURERS' ASSOC.—J. Scribner, 1021 Monadnock Block, Chicago. Meetings with Assoc. Ry. Elec. Engrs.

RAILWAY GARDENING ASSOCIATION.—J. S. Butterfield, Lee's Summit, Mo.; next meeting, August 13-16, Roanoke, Va.

RAILWAY INDUSTRIAL ASSOCIATION.—G. L. Stewart, St. L. S. W. Ry., St. Louis, Mo.; annual, May 12, 1912, Kansas City, Mo.

RAILWAY SIGNAL ASSOCIATION.—C. C. Rosenberg, Bethlehem, Pa.

RAILWAY STOREKEEPERS' ASSOCIATION.—J. P. Murphy, Box C, Collinwood, Ohio. Convention, May 20-22, Buffalo, N. Y.

RAILWAY SUPPLY MANUFACTURERS' ASSOC.—J. D. Conway, 2135 Oliver Bldg., Pittsburgh, Pa. Meetings with M. M. and M. C. B. assocs.

RAILWAY TEL. & TEL. APPLIANCE ASSOC.—W. E. Harkness, 284 Pearl St., New York. Meetings with Assoc. of Ry. Teleg. Sups.

RICHMOND RAILROAD CLUB.—F. O. Robinson, Richmond, Va.; 2d Monday, except June, July and August.

ROADMASTERS' AND MAINTENANCE OF WAY ASSOCIATION.—L. C. Ryan, C. & N. Y., Sterling; September, 1912, Buffalo, N. Y.

ST. LOUIS RAILWAY CLUB.—B. W. Fraumenthal, Union Station, St. Louis, Mo.; 2d Friday in month, except June, July and Aug., St. Louis.

SIGNAL APPLIANCE ASSOCIATION.—F. W. Edmonds, 3868 Park Ave., New York. Meetings with annual convention Railway Signal Association.

SOCIETY OF RAILWAY FINANCIAL OFFICERS.—C. Nyquist, La Salle St. Station, Chicago.

SOUTHERN ASSOCIATION OF CAR SERVICE OFFICERS.—E. W. Sandwich, A. & W. P. Ry., Montgomery, Ala.

SOUTHERN & SOUTHWESTERN RAILWAY CLUB.—A. J. Merrill, Grant bldg., Atlanta, Ga.; 3d Thurs., Jan., March, May, July, Sept., Nov., Atlanta.

TOLEDO TRANSPORTATION CLUB.—J. G. Macomber, Woolson Spice Co., Toledo, Ohio; 1st Saturday, Toledo.

TRAFFIC CLUB OF CHICAGO.—Guy S. McCabe, La Salle Hotel, Chicago; meetings monthly, Chicago.

TRAFFIC CLUB OF NEW YORK.—C. A. Swope, 290 Broadway, New York; last Tuesday in month, except June, July and August, New York.

TRAFFIC CLUB OF PITTSBURGH.—D. L. Wells, Erie, Pittsburgh, Pa.; meetings monthly, Pittsburgh.

TRAIN DESPATCHERS' ASSOCIATION OF AMERICA.—J. F. Mackie, 7042 Stewart Ave., Chicago; annual, June 18, 1912, Louisville, Ky.

TRANSPORTATION CLUB OF BUFFALO.—J. M. Sells, Buffalo; first Saturday after first Wednesday.

TRANSPORTATION CLUB OF DETROIT.—W. R. Hurley, L. S. & M. S., Detroit, Mich.; meetings monthly.

TRAVELING ENGINEERS' ASSOCIATION.—W. O. Thompson, N. Y. C. & H. R., East Buffalo, N. Y.; August, 1912.

WESTERN CANADA RAILWAY CLUB.—W. H. Rosevear, P. O. Box 1707, Winnipeg, Man.; 2d Monday, except June, July and August, Winnipeg.

WESTERN RAILWAY CLUB.—J. W. Taylor, Old Colony building, Chicago; 3d Tuesday of each month, except June, July and August.

WESTERN SOCIETY OF ENGINEERS.—J. H. Warder, 1735 Monadnock Block, Chicago; 1st Monday in month, except July and August, Chicago.

Prince Rupert, the western terminus of the Grand Trunk Pacific, has become so important as a commercial center that steamships are being loaded in England with cargoes to be carried direct to the Pacific port.

At a meeting of the Central Passenger Association in Chicago on March 13 it was decided not to make special rates below two cents a mile for the democratic and republican national conventions to be held in Baltimore and Chicago. Summer tourist rates will be available for those in attendance at either convention.

The boards of trade of Kansas City and other western cities have petitioned the commerce court to review the order of the Interstate Commerce Commission under which the railways delivering grain at Missouri river points were ordered to cease paying elevator allowances, except on grain passing through for destinations beyond.

Beginning April 3, the Erie Railroad will run, for the Ohio State University, a corn and alfalfa instruction train over the Erie lines in that state. The cost of running this train, covering 25 stops and occupying three days, will be about \$1,500; and this sum the railway company contributes for the general good of the communities affected.

The National Industrial Traffic League at a meeting in Chicago on March 14 declined to endorse a bill which has been introduced in Congress providing for the appointment of Deputy Interstate Commerce Commissioners. The matter was referred to the legislative committee for further consideration. The league endorsed the bill providing for a national uniform bill of lading.

The Chicago & North Western, beginning March 25, will run a live stock instruction train in southern Wisconsin, in co-operation with the Wisconsin College of Agriculture and the Wisconsin Live Stock Breeders' Association. The exhibit will include a representative display of stock of types adapted to Wisconsin farming conditions. The live stock exhibit will be installed in a special palace stock car so arranged as to permit of convenient inspection. Another car will be devoted to the dairy exhibit. The speakers will include several agricultural authorities.

The Department of Agriculture (Washington) announces that beginning March 25 the Bureau of Public Roads will run a good roads instruction train over the lines of the St. Louis & San Francisco, starting from Brownsville, Texas, and continuing through a four months' campaign. The trip will cover 15,000 miles of the lines of that and other roads, in eight states. It is planned to give three hundred lectures on good roads topics. The lecturers will have over 100 colored lantern slides. The American Association for Highway Improvement will co-operate with the government and the railway company. The train will consist of four cars, and will carry models of all types of road construction.

Shippers of strawberries in central New York have complained to the State Public Service Commission that the minimum weight charged by the New York Central for a carload of strawberries—10,000 lbs., is unreasonable; this on the ground that because of the quick time that must be made with shipments of strawberries it is impracticable to load two or more consignments in the same car for two destinations; and that, therefore, they are practically compelled to pay for 10,000 lbs. on some small shipments. In 1908 the minimum was 3,000 lbs.; in 1909, it was made 4,000 lbs., and last year 10,000. This increase in prices checked the shipments so that the number of carload lots fell off greatly. The actual increase in the freight bills is claimed to have been from 42 to 79 per cent. Complaint is also made that serious loss was caused by sending strawberries from Utica to Saranac by way of Norwood and Malone, 228 miles, instead of sending by way of Utica, 143 miles.

The Merchants & Manufacturers' Association, composed of 1,500 representative commercial, business and professional men of Milwaukee, has adopted a resolution directed to the Interstate Commerce Commission, the Wisconsin Railway Commis-

sion and the Congress of the United States, asking for more conservative regulation of railways in order to give the railway companies an opportunity to make a reasonable profit and thereby give better service. It is pointed out that the welfare of shippers is seriously threatened by the lack of sufficient equipment and improvement in facilities, a condition for which over-regulation is blamed. The president of the association, General Falk, says: "There is no intention to give the railways more than their just dues. We cannot do without them. They must be prosperous in order to render a good service and to make extensions and improvements. Milwaukee is vitally concerned. Many of the local industries are engaged in the production of railway supplies. A revival of railway business would benefit Milwaukee industries to a very considerable extent."

The New York State College of Agriculture is to run an instruction train over the Delaware & Hudson beginning April 1 and visiting towns in the state of New York along that company's lines for the two weeks following. The train is to be made up of six cars, including four demonstration cars. In variety this traveling school apparently will rival, and perhaps will surpass all others. According to the announcement "three cows from the college herd will illustrate the possibilities in developing good grade cows from common stock. Various plant diseases will be shown by mounted specimens of affected plants, and these will be studied with the help of microscopes. Visitors will have an opportunity to grade and test eggs. Women will find an exhibit of inexpensive and practical labor-saving devices for the home, to be shown in operation. The underlying principles of cooking certain classes of food will be given in lectures and illustrated by the actual cooking of the foods. Insect pests will be shown in various stages of development. An exhibit of spraying nozzles, chemicals and materials will show the best methods of controlling insect pests." The lectures will be given by nine experts from the college.

The case of C. M. Cole, a wealthy cotton factor of Memphis, Tenn., against the St. Louis, Iron Mountain & Southern, which has attracted a good deal of attention in the federal district court of West Tennessee, was dismissed on March 5. Mr. Cole was suing the railway company for \$250,000 damage, claiming that he had been maliciously prosecuted. Cole had been prosecuted by the road recently on the charge of stealing cotton from the platforms of the company in Memphis, but he won the suit. In the present case Cole sought to recover damages which he conceived had accrued to himself and his business as a result of the prosecution. The presiding judge, however, in his instructions to the jury, stated that it had not been proved that the former prosecution was brought with malicious intent. Indeed, he held that the railway company had shown reasonable grounds for a suit against Cole, and that Cole had not been able thoroughly to disprove suspicions arising from the charges against him. And since, in his opinion, the guilt or innocence of Cole was not the point at issue, but rather the responsibility of the company for having brought its suit, it was judged that the company could not be held for damages, and the jury was so instructed. A motion for a new trial has been filed by the attorneys for Cole, claiming that the court has erred on four points during the trial.

#### January Earnings.

The Bureau of Railway Economics, 1329 Pennsylvania avenue, Washington, reports that January railway receipts have fallen off while expenses increased. Returns for the month received by the Interstate Commerce Commission covering about 93 per cent. of the mileage of the country, show total operating revenues of \$203,143,118, and operating expenses \$158,911,489. In comparison with January, 1911, this is a decrease of \$2,886,149 in revenues and an increase of \$4,205,871 in expenses. Net operating revenue, \$44,231,629, is less than for January, 1911, by \$7,092,020; an average decrease of \$34 per mile of line for the month, or 15 per cent.

#### High [Speed] Living.

A party of tourists which recently traveled over the Grand Trunk Railway of Canada continuously for five days, was served during that time, on the dining cars, with 660 meals daily, or 3,300 meals in all. This was done on two standard dining cars, each having a seating capacity of 30 persons and managed by one

conductor, four cooks and five waiters. At this rate each waiter served, at each meal, an average of 22 persons; and each chair would be used an average of three and two-thirds times at each meal. Moreover, the press agent avers that the passengers unhesitatingly testified that this dining car service was superior to anything which they had had on their entire trip. As to the unfortunate dining cars, steamboats or hotels which are thus relegated to second place, no names are given.

#### Traffic Club of Chicago.

Several active campaigns are being conducted in the Traffic Club of Chicago in preparation for the annual election to be held on March 26. Three tickets of officers for the ensuing year have been nominated. The regular ticket of the nominating committee was published in the *Railway Age Gazette* of March 1. A second ticket names the same candidates as the regular ticket, with the exception that it includes John H. Grace, assistant general freight agent of the Great Northern Railway as a candidate for treasurer, which office he has held since the organization of the club. A third ticket nominates the following: President, J. Charles Maddison, traffic manager of Montgomery Ward & Co.; first vice-president, W. H. Cochrane, general manager Chicago & South Haven Steamship Company; second vice-president, J. A. Tapee, assistant traffic manager Morris & Company; third vice-president, J. J. Armstrong, traffic manager, Pickands, Brown & Company; secretary, W. H. Wharton, commercial agent Nashville, Chattanooga & St. Louis; treasurer, Harry Zweig, traffic manager J. Rosenbaum Grain Company.

#### California Raisin Day.

This anniversary, inaugurated three years ago, will be celebrated again this year on April 30. Raisin Day has now become an annual affair, and we are assured "there is hardly a part of the United States where raisins are not eaten on this occasion." The Southern Pacific and other railways prepare special menus for their dining cars, all of which have some dish containing raisins. A committee is to issue 40,000 posters and window cards, 100,000 post cards and 2,000,000 stickers, to be distributed throughout the country.

#### Railways and the Panama Canal.

Vice-President Kruttschnitt, of the Union and Southern Pacific Lines, takes an intelligent view of the relation of the transcontinental railways to the Panama canal. He admits that a good deal of business might be lost by the Southern Pacific to the canal, but he sees compensating advantages in the increase in short-distance traffic which would result from opening the water route between the coasts. If the canal is to be successful it will result in building up business inland from the coasts, especially on the Pacific side, where there is ample room for development. "The great shipping and consuming public," Mr. Kruttschnitt said, "does not live at seaports." The railways will continue to move traffic which requires frequency and expedition of service, and they will gather and land at the docks freight which is to be sent by water and distribute that which is brought in by water; and they are likely to gain twice as much as they lose, through the development that will take place. This is a broad and enlightened view which is not often enough taken by railway managers in considering the competition of water routes. There is no more reason why railways should control steamship lines than why steamship companies should control railways. Neither can do the proper work of the other, and, if left free and independent, each will help the other, and it is to the advantage of the public that neither should control.—*Journal of Commerce, New York.*

#### INTERSTATE COMMERCE COMMISSION.

The commission has suspended until July 13 certain tariffs, naming increased rates for the transportation of hay, filed by the Chicago & Northwestern and other roads west of Chicago. These tariffs as filed were to go into effect March 15.

The commission, on Tuesday of this week, announced its decision in a number of cases involving freight rates on coal from

the Virginia and Pittsburgh districts to Lake Erie. On bituminous coal from Pittsburgh to the Lake the rate of 88 cents a ton is ordered reduced to 78 cents. From the Thacker district in Virginia to the Lake an advance made by the railways from 97 cents a ton to \$1.065 a ton, and from the Pocahontas district an advance from \$1.12 to \$1.2125, are sustained by the commission. The commission refused to approve the following proposed advances: from the Fairmount district, 96¾ cents to \$1; from the Kanawha district, from 97 cents to \$1.065; from the New River district, from \$1.12 to \$1.2125. The opinion in the Virginia case, prepared by Commissioner Lane, includes an exhaustive study of the cost of transporting this coal. The opinion in the Pittsburgh case, by Commissioner Meyer, also goes into details of cost.

#### Sugar Rates Reasonable.

*Rates and Practices of the Louisiana Railway and Navigation Company. Opinion by Commissioner Clark:*

This road has on file a "local import tariff" applying on sugar imported from foreign countries, etc., to Gramercy, La. The rail haul from New Orleans or Port Chalmette to Gramercy is wholly within the state of Louisiana. When the sugar is being loaded into vessel at foreign port the New Orleans agent of the Gramercy refinery is notified and he notifies agent of the railway; the railway loads the sugar into its cars at the wharves, has it switched to its terminal, and transports it to Gramercy; *Held*, That the rail transportation is subject to the federal act. On complaint that the rail carrier is transporting this sugar at less than the cost of the service, and thereby effecting discrimination against sugar refinery at New Orleans; *Held*, That under the tariff as amended subsequently to the institution of the inquiry the service is not performed at less than cost and that the practice does not effect undue discrimination. (22 I. C. C., 558.)

#### COURT NEWS.

In the Federal court at Buffalo, N. Y., on Tuesday of this week, the Delaware, Lackawanna & Western was fined \$2,000, or \$100 each on 20 counts, for carrying hay from Buffalo, N. Y., to Scranton, Pa., without charge. The hay was to be used in feeding the mules in the coal mines controlled by the company.

The Commerce Court, on March 20, issued a peremptory writ of mandamus requiring the Louisville & Nashville and the Southern Railway to receive and transport coal from the Stony Fork Coal Company and the Ralston Coal Company in Kentucky. The two roads had refused shipments because of disagreement as to which company should furnish the cars, and the coal companies lost a great amount of business. Judges Archbald and Mack dissented.

The Nyasaland Protectorate, Africa, already possesses a railway within its borders known as the Shire Highlands Railway, 113 miles long. This line runs from Port Herald, on the Shire river at the southern entrance to the Protectorate, first to Chiromo and then through the Shire Highlands to Blantyre. During the short time it has been in operation it has caused such a development of the country it serves that an outlet to the coast has become urgently necessary. If the present arrangements are completed, the government will buy for \$900,000 from the British Central Africa Company, public lands to which the Shire Highlands Railway Company is entitled, and will guarantee interest at 4 per cent. for a term of years on the \$2,500,000 required for extension of the Shire Highlands Railway from Port Herald southward to the northern bank of the Zambesi river, subject to the consent of the Portuguese government to the railway passing through its territory. This arrangement is also dependent on the construction of a railway through the Mozambique company's territory from Beira to a point on the southern bank of the Zambesi opposite the river terminus of the Shire Highlands extension. The combined length of the proposed new railway will be about 250 miles. The northern line will run from Port Herald along the bank of the Shire river and touch the Zambesi at Kaia, near the junction of the two rivers, to which place the Zambesi is navigable all the year round. This section is about 70 miles long and will be of 3-ft. 6-in. gage.

## Railway Officers.

### ELECTIONS AND APPOINTMENTS.

#### Executive, Financial and Legal Officers.

W. S. Kinnear, president of the Kansas City Terminal, with office at Kansas City, Mo., has resigned to become president of the United States Realty & Trust Co., New York, effective May 1. Mr. Kinnear was chief engineer of the Michigan Central from September, 1902, to April, 1905, and was then made assistant general manager of the same road. He was also chief engineer of the Detroit River Tunnel Company. He went to the Kansas City Terminal in August, 1910.

#### Operating Officers.

E. C. Riddle, superintendent of the Western Ohio, with office at Wapakoneta, Ohio, has resigned.

E. J. Dedman has been appointed general manager of the Gainesville & Northwestern, which is building a new line in Georgia, with headquarters at Gainesville, Ga.

C. L. Hinkle, assistant to the general manager of the Chicago & Alton and the Toledo, St. Louis & Western at Chicago, has been appointed superintendent of the latter road, with office at Frankfort, Ind., succeeding J. F. Clement, resigned.

T. T. Irving, resident engineer of the Grand Trunk at Detroit, Mich., has been appointed trainmaster of the Twenty-fifth district (C. S. & M.), and the Twenty-seventh and Twenty-eighth districts, with office at Durand, Mich., succeeding J. C. Talmage, resigned.

N. A. Williams, superintendent of the Green river division of the Denver & Rio Grande at Helper, Utah, has been appointed superintendent of the Salt Lake division, with office at Salt Lake City, Utah, succeeding W. M. Bacon, resigned. J. T. Slattery, trainmaster at Tucker, Utah, succeeds Mr. Williams.

J. T. Waddell, chief dispatcher of the Georgia, Florida & Alabama at Bainbridge, Ga., has been appointed superintendent of transportation, with headquarters at Bainbridge, succeeding S. J. Jones, resigned to go to another company, and T. A. Connor has been appointed car accountant, with headquarters at Bainbridge.

C. A. Manthe has been appointed trainmaster of the Fergus Falls division of the Great Northern, with office at Melrose, Minn., succeeding J. W. Granger, transferred. Walter Clarke, assistant superintendent at Spokane, Wash., having been assigned to other duties, as has been announced in these columns; F. J. Gavin, trainmaster at Whitefish, Mont., has been transferred to Spokane; and W. W. McFadden succeeds Mr. Gavin.

R. A. Crofton has been appointed assistant superintendent, and not assistant general manager, of the Second division of the Houston & Texas Central, the Houston East & West Texas, and the Houston & Shreveport, with headquarters at Houston, Tex.; this is only a part of the territory formerly supervised by J. T. Connor, assistant general manager at Houston, who has been granted an indefinite leave of absence. This corrects the item in our issue of February 23, p. 357.

#### Traffic Officers.

H. F. Moeller, general passenger agent of the Pere Marquette, with office at Detroit, Mich., has resigned.

Ernest J. Derry has been appointed a freight solicitor of the Union Line of the Pennsylvania System, with office at Kansas City, Mo., succeeding R. V. Telfer, resigned.

E. L. Wilson, chief clerk in the office of the general passenger agent of the New York, New Haven & Hartford at New Haven, Conn., has been appointed assistant general passenger agent, with office at Boston, Mass.

F. G. Smith has been appointed general freight and passenger agent of the Marietta, Columbus & Cleveland, with headquarters at Marietta, Ohio, succeeding E. D. Perkins, resigned to accept service with another company.

Fred Wright, district passenger agent of the Chicago Great Western at Omaha, Neb., has been appointed division passenger

agent, with headquarters at Red Wing, Minn. S. G. Yerkes, general agent, with office at Fargo, N. D., has resigned.

Glenn W. Hutchinson, advertising manager of the St. Louis & San Francisco, at St. Louis, Mo., has resigned to become southwestern manager of the American Lithographic Company, New York, effective April 1. Mr. Hutchinson's headquarters will be at St. Louis.

#### Engineering and Rolling Stock Officers.

F. P. Sisson has been appointed resident engineer of the Grand Trunk, with office at Detroit, Mich., succeeding T. T. Irving, promoted.

C. W. P. Ramsey, division engineer of construction of the Canadian Pacific at Montreal, Que., has been appointed engineer of construction for the Eastern Lines, with office at Montreal.

C. W. Abrams, assistant general foreman of the Missouri Pacific at Little Rock, Ark., has been appointed general directing foreman, succeeding George Langton, resigned to accept service with another company, and the office of assistant general foreman has been abolished.

J. G. Shillinger, engineer maintenance of way of the Cleveland-Indianapolis division of the Cleveland, Cincinnati, Chicago & St. Louis at Galion, Ohio, has been appointed chief engineer of the Rutland Railroad, with office at Rutland, Vt., succeeding J. C. Irwin, resigned, effective April 1.

C. B. Brown, division engineer of the Canadian Pacific at Montreal, Que., has been appointed principal assistant engineer, with office at Montreal, and J. W. Orrock, assistant engineer at Montreal, has been appointed division engineer of the Lake Superior division, with office at North Bay, Ont., succeeding Frank Taylor, transferred.

P. P. Mirtz has been appointed mechanical engineer of the Lake Shore & Michigan Southern, the Chicago, Indiana & Southern, the Indiana Harbor Belt, the Lake Erie, Alliance & Wheeling, the Lake Erie & Western, the Dunkirk, Allegheny Valley & Pittsburgh, the Fort Wayne, Cincinnati & Louisville and the Northern Ohio, with office at Cleveland, Ohio, succeeding A. R. Ayers, promoted.

George K. Stewart, who has been appointed master mechanic of the Missouri Pacific-Iron Mountain system, with office at Coffeyville, Kan., as has been announced in these columns, was born August 5, 1869, at Ottawa, Kan. He received a common school education, and in 1889 began railway work as a machinist apprentice on the Atchison, Topeka & Santa Fe at Topeka, Kan. In 1898 he went with the Missouri Pacific as a machinist and has been with that company ever since. He was night roundhouse foreman at Coffeyville for two years and was day roundhouse foreman for one year at the same place. He was transferred to Wichita, Kan., as division foreman in 1909, and held that position until March 4, 1912, when he was promoted to master mechanic of the Missouri Pacific-Iron Mountain system as above noted.

W. J. Eddy has been appointed inspector of tools and machinery of the Rock Island Lines, with office at Chicago. Mr. Eddy was born in England, and previous to September, 1903, he was a machinist's apprentice and journeyman in the shops of the Choctaw, Oklahoma & Gulf at Shawnee, Okla. He was graduated from Purdue University with the degree of mechanical engineer in 1907, and in September of that year entered the service of the Erie Railroad as tool room inspector. While he was in that

position the small tools were standardized and a classification and record of all shop equipment was made, as was mentioned in the *Railway Age Gazette* of November 4, 1910, page 851. Mr. Eddy is also the originator and specialist in installing the shop standard practice system on that road.

M. V. Hynes, division engineer of the Cincinnati, Hamilton & Dayton, at Dayton, Ohio, has been appointed engineer of maintenance of way, with office at Cincinnati, succeeding to engineering duties performed by F. H. Alfred, general superintendent, resigned to go to another company. I. F. White, division engineer at Indianapolis, Ind., has been transferred to Dayton, succeeding Mr. Hynes, and H. A. Cassil succeeds Mr. White.

A. R. Ayers, mechanical engineer of the Lake Shore & Michigan Southern, the Indiana Harbor Belt and the Chicago, Indiana & Southern at Cleveland, Ohio, has been appointed general

mechanical engineer of all the New York Central Lines west of Buffalo, with office at Chicago, a new position. Mr. Ayers graduated from Cornell University in 1900 as a mechanical engineer, and began railway work with the Lake Shore & Michigan Southern as a special apprentice in the same year, and he has been connected with the Lake Shore ever since. He was special inspector from 1903 to 1905, and in the latter year was made night engine house foreman at Elkhart, Ind. The next year he was made assistant general foreman of the Collinwood shops, and in 1907



A. R. Ayers.

was promoted to superintendent of shops at Elkhart. From January 1, 1908, to November 1 of the same year he was assistant superintendent of shops at Collinwood, and on the latter date was appointed assistant master mechanic, with office at Elkhart. He was appointed mechanical engineer of the Lake Shore, the Chicago, Indiana & Southern and the Indiana Harbor Belt, with office at Cleveland, Ohio, in 1910, from which position he has just been promoted as above.

#### OBITUARY.

Robert Patterson, a number of years ago master mechanic of the Florence & Cripple Creek Railroad, died at his home in Denver, Colo., on March 10, at the age of 60 years.

T. L. Waggener, formerly chief engineer of the Colorado Springs & Cripple Creek District Railway, died at his home in Colorado Springs, Colo., on March 10. Mr. Waggener was 67 years of age.

Franklin J. Firth, formerly president of the Erie & Western Transportation Company, a subsidiary of the Pennsylvania Railroad, operating steamers on the Great Lakes, died on March 18 after a long illness, at his home in Philadelphia, Pa., at the age of 70. Mr. Firth retired from the presidency of the Erie & Western Transportation Company in 1906.

Frank Bradley Mesick, general eastern freight agent of the Chicago, Rock Island & Pacific, from 1882 to 1911, died at his home in Flatbush, Brooklyn, N. Y., on March 18. Mr. Mesick was born in Columbia county, N. Y., on January 29, 1854, and in 1871 began railway work in the eastern freight office of the Rock Island, and in 1882 he became general eastern freight agent, his entire railway career has been in the service of the Rock Island System. On account of ill health Mr. Mesick was retired in September, 1911. He was a man of great kindness of heart, and with a remarkable faculty for both making and holding friends.



G. K. Stewart.

## Equipment and Supplies.

### LOCOMOTIVE BUILDING.

THE PENNSYLVANIA RAILROAD has ordered 52 locomotives from the company's shops at Altoona, Pa.

THE CHICAGO GREAT WESTERN has ordered 5 mikado locomotives from the Baldwin Locomotive Works.

THE NORFOLK & WESTERN has ordered 6 Pacific type locomotives from the Baldwin Locomotive Works.

THE ST. LOUIS SOUTHWESTERN is in the market for 20 consolidation locomotives and five mogul locomotives.

THE TEXAS PACIFIC has ordered 10 consolidation locomotives and 10 passenger locomotives from the Baldwin Locomotive Works.

THE SOUTHERN PACIFIC has ordered 15 mogul locomotives, 10 Pacific type locomotives and 8 six-wheel switching locomotives from the Baldwin Locomotive Works.

THE ATCHISON, TOPEKA & SANTA FE has ordered 25 Pacific type locomotives, 20 switching locomotives, 20 Santa Fe locomotives and 10 consolidation locomotives from the Baldwin Locomotive Works.

### CAR BUILDING.

THE GRAND TRUNK PACIFIC is in the market for 6 sleeping cars.

THE WABASH has ordered 200 all-steel hopper cars from the Standard Steel Car Company.

THE CHICAGO, ROCK ISLAND & PACIFIC has ordered 700 gondola cars from the Standard Steel Car Company.

THE PENNSYLVANIA RAILROAD has ordered 26 combination baggage and mail cars and 7 dining cars from the company's shops at Altoona, Pa.

THE ST. LOUIS SOUTHWESTERN is in the market for fifteen 70-ft. baggage cars, twelve 70-ft. combination mail and express cars and eight 70-ft. chair cars.

THE ULSTER & DELAWARE is in the market for from 50 to 100 box cars, and is said to have ordered three combination baggage and mail cars from the Pullman Company. The latter item is unconfirmed.

THE NEW YORK, NEW HAVEN & HARTFORD, mentioned in the *Railway Age Gazette* of March 15 as having ordered a number of motor cars from the Standard Steel Car Company, has ordered 39 motor cars from that company.

THE WESTERN MARYLAND has ordered 500 fifty-ton gondola cars and 500 hopper cars from the Pressed Steel Car Company; 500 forty-ton gondola cars and 500 hopper cars from the Standard Steel Car Company, and 500 box cars from the American Car & Foundry Company.

THE ATCHISON, TOPEKA & SANTA FE is in the market for 1,250 box cars, 1,000 refrigerator cars, 200 furniture cars, 200 steel tank cars, 1,000 all-steel, flat cars, 75 work cars, 15 smoking cars, 10 combination passenger and mail cars, 10 chair cars, 14 three-compartment Jim Crow cars, and 1 combination passenger and baggage car.

### IRON AND STEEL.

THE LONG ISLAND is in the market for 2,000 tons of bridge material.

THE WABASH has ordered 15,000 tons of rails from the Lackawanna Steel Company.

THE NEW YORK, NEW HAVEN & HARTFORD has ordered 11,000 tons of open hearth rails from the Pennsylvania Steel Company.

THE ST. LOUIS SOUTHWESTERN has recently purchased a large amount of bridge material, including one 355-ft. draw span; two through girder spans 54 ft. 2 in.; one 70-ft. through girder span and three 74-ft. 6 in. through girder spans from the Phoenix Bridge Company.

## Supply Trade News.

The Osborn Engineering Company, Cleveland, Ohio, civil engineers, will on April 1 move its main office from the Osborn building to the Engineers building.

R. T. McCormick has resigned as manager of sales of the Petroleum Iron Works Company, Sharon, Pa., and C. J. McDowell has been appointed to succeed him.

John Dickey Culbertson, president of the National Tube Company, Pittsburgh, Pa., a subsidiary of the United States Steel Corporation, died at his home in Sewickley, Pa., on March 13.

C. W. Reinhardt, for the past 20 years chief draftsman of the *Engineering News*, New York, has resigned his position and opened a general drafting office at 120 Liberty street, New York.

Scully-Jones & Company, Chicago, have been made exclusive agents in Illinois, Indiana, Iowa and Wisconsin for Elco high-speed steel, made by Vickers Sons & Maxim, Sheffield, England.

Martin Prehn, assistant eastern manager and associate editor of the *Railway & Engineering Review*, Chicago, has been made sales manager of the Revolue Machine Company, New York, manufacturers of blue printing machinery, effective March 25.

C. C. Owens, in the New York sales office of the Westinghouse Electric & Manufacturing Company, Pittsburgh, Pa., with special charge of the industrial and power division, has been made district manager of the Westinghouse company, with office in Detroit, Mich.

Cornell S. Hawley, former president of the Consolidated Car Heating Company, Albany, N. Y., has been made president of the Laconia Car Company, Boston, Mass. Craig Colgate, William L. Putnam, Harold J. Coolidge and Robert T. Paine, 2nd, were elected to the board of directors. The Laconia Car Company was recently organized to take over the Laconia Car Company Works. It is capitalized at \$2,000,000, consisting of \$1,000,000 7 per cent. cumulative preferred stock and \$1,000,000 common stock.

The Bucyrus Company, South Milwaukee, Wis., has taken over the manufacture of the Atlantic type shovel, heretofore built by the American Locomotive Company, New York, and under a license from A. W. Robinson, the patentee, it is the expectation of the company to continue to build all of the sizes previously built, and to eventually have a complete line of Atlantic wire-rope shovels, in addition to a complete line of Bucyrus chain-type shovels. The Bucyrus company has transferred the manufacture of Vulcan shovels from Toledo, Ohio, to the new plant at Evansville, Ind. Norman B. Livermore & Co., San Francisco, Cal., will handle the steam shovels, wrecking cranes, pile drivers and ballast plows of the Bucyrus company in California, and the same products, with the addition of drag line excavators, in Nevada, Utah and Arizona. Arrangements have been made with the Yuba Construction Company, San Francisco, Cal., for the handling of the Bucyrus dredges on the Pacific coast and in Alaska. Smith & Wiggan, Mexico City, Mex., are agents for the Bucyrus company in Mexico. George B. Massey, for a number of years in charge of the New York office of the company, is now at South Milwaukee preparing for an extensive trip abroad in the interest of the company's foreign business.

The reorganization committee of Allis-Chalmers Company, Milwaukee, Wis., has given out its plans of reorganization. The preferred stock will be assessed 20 per cent., or \$3,210,000; the common stock, 10 per cent., or \$1,982,000, providing \$5,192,000 working capital. Ten per cent. of the respective assessments are to be paid on deposits of share certificates and the balance on or after October 1 on 30 days' notice. A new corporation is to be organized with \$42,500,000 capital stock, consisting of \$26,000,000 common and \$16,500,000 7 per cent. cumulative preferred. The preferred stock is to be cumulative 5 per cent. from January 1, 1913, 6 per cent. from January 1, 1915, and 7 per cent. from January 1, 1917, but to be entitled to 7 per cent. from beginning if earned. If practicable the new preferred stock is to have power to elect the majority of the board of directors and is to be redeemable at 110. A voting trust of new preferred and common stock is to be created for five years with five voting

trustees, to be appointed by the reorganization committee, which consists of James M. Wallace, chairman; C. W. Cox, A. J. Hemphill, R. W. Leigh, J. H. McClement, W. E. Roosevelt and F. Vogel, Jr. The new preferred stock will be distributed as follows: 5 per cent. to bondholders, \$11,148,000; to stockholders or underwriters, on payment of assessments, \$5,192,000, leaving a surplus of \$160,000. The new common stock will be distributed as follows: 5 per cent. to bondholders, 35 per cent. of holdings in consideration of release of lien and fixed charges, \$3,901,800; old preferred stock, 90 per cent. of holdings, \$14,445,000; old common stock, 35 per cent. of holdings, \$6,937,000, leaving a surplus \$716,200. The results to present holders of the securities are as follows: For each \$1,000 5 per cent. bond a total value of \$1,375, of which \$1,000 new preferred, \$350 new common and \$25 coupon of January 1 in cash; for each \$100 par preferred stock upon payment of \$20 in cash, a total value of \$110, of which \$20 will be new preferred stock and \$90 new common stock; for each \$100 par value of common stock, a total value of \$45, of which \$10 will be in new preferred stock for the \$10 assessment and \$35 in new common stock. To carry out the plan, a receiver will have to be obtained, but will probably not be asked for until April 3, at which time the 90 days' grace expires. The reorganization plan was formulated by the bondholders.

#### TRADE PUBLICATIONS.

**CHAIN CARE.**—The Jones & Laughlin Steel Company, Pittsburgh, Pa., has published a small illustrated folder giving some valuable suggestions for the care of chains.

**FIRE EXTINGUISHER.**—The Pyrene Manufacturing Company, New York, has published a small illustrated folder describing and pointing out the advantages of Pyrene as a fire extinguisher.

**VALVES & FITTINGS.**—The Crane Company, Chicago, has published a special railway catalog, No. 42-A, illustrating and briefly describing its line of valves, air-brake fittings, unions, union fittings, etc. The prices are included.

**BANGOR & AROOSTOOK.**—The passenger department of this company has published a very attractive 170-page booklet entitled *In the Maine Woods*. This booklet describes in a most alluring manner the many types of sport and pastimes that may be found in this region. The carefully selected illustrations and the descriptions of the country combine to give a splendid idea of life in the woods.

**CHICAGO & NORTH WESTERN.**—The passenger department has issued an attractive bulletin, entitled *The Care of the Immigrant*, describing and illustrating the especially complete arrangements in the company's new passenger terminal at Chicago for handling and protecting immigrant travel while awaiting trains. In the construction of the station special provision was made for taking care of the immigrants, including a waiting room in charge of a custodian and matron, rest rooms, lunch room, bath rooms and laundries, writing tables and current newspapers in foreign languages. Every precaution is taken to safeguard such passengers until they are able to communicate with friends or reach their destination.

**STEAM TABLES.**—The Wheeler Condenser & Engineering Company, Carteret, N. J., has published a hand book of steam tables with pressures below atmosphere expressed in inches of mercury, referred to a 30-in. barometer. In the first table the independent variable is vacuum; properties of saturated steam from 29.8 in. vacuum to atmospheric pressure are given. In the second, temperature is the independent variable; properties of saturated steam from 32 deg. Fahr. to 212 deg. Fahr. are given. In the third table the independent variables are gage pressure and absolute pressure; properties of saturated steam up to 200 lbs. gage pressure are given. The booklet also includes a discussion of the use of the mercury column, the errors in such measurements and constants for their correction. These tables are copyrighted and are neither for sale nor for general distribution. They are published primarily for engineers who are using and purchasing condensing apparatus.

The Dourado Railroad, Brazil, has been granted a concession to build a line from Sao Joao das Tres Barras to San Jose do Novo Horizonte.

## Railway Construction.

### New Incorporations, Surveys, Etc.

**ALBERTA, PEACE RIVER & EASTERN.**—This company has been granted an extension of five years' time in which to complete a line from a point on the Alberta Railway & Irrigation Company's line in township three, range 16, west of the fourth meridian, west towards Cardston, west and northwest to Pincher creek and northerly to Cochrane, Alta., in all about 200 miles. From Cochrane the line is to be built north to the Peace River line, then east to Fort McHenry and eventually east to Fort Churchill on Hudson Bay, with a branch from a point on the line between parallels 51 and 52. A. J. Millar, Pembroke, Ont.; E. Hutton, Montreal, Que., R. L. Snowball, O. E. Culbert and J. O. Carss, Ottawa, Ont., are the incorporators.

**BARTLESVILLE INTERURBAN.**—An officer writes that this company plans to build from Dewey, Okla., north via Copan, to Caney, Kan., 16 miles. There will be three 90-ton steel bridges and two culverts, also a station and a sub-station at Copan. J. J. Carl, president.

**BRITISH COLUMBIA & DAWSON.**—Authority has been granted to this company to build from Fort George, B. C., northerly via Fort McLeod, thence along the Parsnip river to its junction with the Peace river and along the valley of the Finlay river via Sifton Pass and along the Stikine river to Telegraph creek; also from this line via Pine River Pass, or the Peace River Pass, to Peace River Landing; from Lytton north to Fort George, about 250 miles, and from Telegraph creek to Dawson, Yucatan territory, with a branch from Ashcroft south to Vancouver, about 120 miles. The incorporators include J. Walkenstein, A. T. Sullivan and C. G. Young, New York, and J. O. Clifford, Chicago.

**CANADIAN NORTHERN.**—Authority has been granted to the Canadian Northern Montreal Tunnel & Terminal Company to build a tunnel for one or more tracks from a point in the city of Montreal, Que., in a westerly direction under Mount Royal with the necessary approaches, terminals, stations, etc. Tracks are to be laid to connect with the Canadian Northern Ontario, the Canadian Northern Quebec, and the Montreal Harbor Commissioners' line. Electricity will be used as the motive power for all trains run through the tunnel. T. Turnbull, assistant chief engineer, Winnipeg, Man. (January 5, p. 36).

**CANADIAN NORTHERN MONTREAL TUNNEL & TERMINAL COMPANY.**—See Canadian Northern.

**CANADIAN PACIFIC.**—A contract has been given to W. A. Dutton, Winnipeg, Man., for grading 85 miles of the extension from Swift Current, Sask., northwest. A contract has also been given to Mr. Dutton for double tracking about 70 miles on the main line between Regina, Sask., and Chaplin. J. G. Sullivan, chief engineer, Western Lines, Winnipeg, Man.

A contract has been given to Deeks & Hinds, Toronto, Ont., to build from the present Toronto-Montreal line at Agincourt, Ont., northeast to the same line at a point 20 miles west of Smith's Falls, 198 miles. The work is to be completed within two years. J. M. R. Fairbairn, assistant engineer, Eastern Lines, Montreal, Que.

**CARY NORTH & SOUTH.**—An officer writes that a contract has been let to T. W. Ellis, Jr., Macon, Ga., to build from Cochran, Ga., north to Cary, 10 miles. Maximum grades will be 1 per cent., and maximum curvature 6 deg. The company recently amended its charter to build via Toombsboro and Milledgeville, to Sandersville. H. R. Brown, president, and D. B. Dunn, chief engineer, Macon. (December 15, p. 1257.)

**CHICAGO, MILWAUKEE & ST. PAUL.**—This company is planning to spend \$15,500,000 for grade reductions and double tracking work. Of this amount \$10,000,000 will be used for the reduction of grades and double track on the Council Bluffs division, and for improvements to lines and double track on the Hastings & Dakota division \$5,500,000 will be spent. It is expected that it will take three years to complete the improvements.

**CHICAGO, MILWAUKEE & PUGET SOUND.**—A contract has been given to H. C. Henry, Seattle, Wash., to build an extension down the Columbia river from Cohasset to Hanford, and the work is now under way. The company will build 43 miles of main line and seven miles of side tracks this year, which will

complete the line through the Priest Rapids district and White Bluffs country into Hanford. E. O. Reeder, chief engineer, Seattle, Wash.

**EAST TEXAS TRACTION.**—Incorporated in Texas with \$2,000,000 capital, and headquarters at Greenville, Tex. The plans call for building a line to connect Dallas, Tex., via Greenville, with Wolfe City, about 70 miles. The incorporators include J. F. Nichol, W. A. Williams and J. W. Crotty, Dallas.

**FORT SMITH, ARKOMA & WILBURTON.**—Incorporated in Oklahoma with \$50,000 capital to build from Arkoma, Okla., which is opposite Fort Smith, Ark., southwest to Wilburton, 60 miles. The incorporators include M. C. Burke, C. T. Kinney and J. Vaughan, all of Fort Smith, and M. W. Murray, Arkoma.

**FREDERICTON & GRAND LAKE COAL & RAILWAY COMPANY.**—The New Brunswick legislature has granted permission to this company to build an extension of the New Brunswick Coal & Railway line from Minto, N. B., to Fredericton, and to lease the entire line to the Canadian Pacific.

**GARRETT COUNTY (Electric).**—Application has been made for a charter in Maryland to build from Oakland, Md., northeast to Frostburg, about 40 miles. H. J. Speicher, Accident, Md., may be addressed.

**GLENGARY & STORMONT.**—Application has been made by this company, with \$600,000 capital and headquarters at Alexandria, Ont., for a charter to build from a point on the Canadian Pacific, near the eastern boundary of Ontario, in Lancaster township, south and west to a point near the St. Lawrence river in Charlottenburg township, thence west to Cornwall. C. L. Hervey and A. A. Mellor, Montreal, and T. Burgess, Ottawa, are interested.

**GRAND TRUNK PACIFIC.**—Track-laying on the Rocky Mountain section has been finished from Wolf Creek to Athabaska river, 100 miles; between Yellowhead Pass and Tete Jaune Cache, 79 miles, track has been laid on 58½ miles, and between Aldermere and Copper river, 140 miles, track has been laid on 38 miles. Track has also been laid from Copper river to Prince Rupert, 100 miles. B. B. Kelliher, chief engineer, Winnipeg, Man.

**GREENVILLE LIGHT & WATER COMPANY.**—An officer writes that the plans call for building a line to connect Greenville, Ky., with Central City, about five miles, and the work will probably be started this coming fall. The line will pass through seven mining towns. A power house is to be put up to supply power for all the mines on the line. J. A. Rose, box 43, Greenville, may be addressed.

**INTERCOLONIAL.**—An officer writes that a contract has been given to M. P. & J. T. Davis, Quebec, Que., to build the branch from Dartmouth, N. S., to Dean's Settlement, 73 miles, and the work is to be started at once. The line is being built under the direction of the Department of Railways and Canals, L. K. Jones, secretary, Ottawa, Ont. (October 20, p. 815).

**KINSTON TERMINAL.**—Application will be made for a charter in North Carolina to build from Kinston, N. C., south to Richlands, about 25 miles. R. C. Strong, Kinston, may be addressed.

**KITTITAS RAILWAY & TRANSPORTATION COMPANY.**—This company has been incorporated in Washington to build an electric line from South Cle Elum, Wash., to Roslyn. Work is now under way. The line is being built to reach coal and copper fields. Paul L. Richards, representing French capitalists, is back of the project.

**LOUISVILLE & NASHVILLE.**—An officer writes that a contract has been given to S. Walton & Company, Falls Mills, Va., for piercing a tunnel to be about 1,500 ft. long in Giles county, Tennessee. The estimated cost of the work is \$225,000. W. H. Courtenay, chief engineer, Louisville, Ky.

**MAINE CENTRAL.**—A contract has been given to McGregor Brothers, Rumford Falls, Maine, to build the Rangely Lakes & Megantic from Oquossoc, north along the east shore of the Kennebec river to Kennebecago, about 11 miles. T. L. Dunn, chief engineer, Portland. (February 2, p. 221.)

**MISSOURI, KANSAS & TEXAS.**—It is understood that this company is planning to build an extension from Austin, Tex., south to Lockhart, about 30 miles, where a connection is to be made with the Smithville branch. Plans are being made for building

a bridge over the Colorado river. S. B. Fisher, chief engineer, St. Louis, Mo. (March 1, p. 408.)

**MORGANTOWN INTERURBAN.**—An officer writes that the company expects to begin work soon on a line between Morgantown, W. Va., and Point Marion, Pa., about 10 miles. It has not yet been decided when bids will be asked for the work. I. H. McDermott, president; S. D. Brady, chief engineer, Morgantown.

**MOUNT MCKAY & KAKABEKA FALLS.**—An officer writes that this company is building a 20-mile line from Slate River, Ont., to Kakabeka Falls; track has already been laid on 5½ miles. The work is to be carried out under the direction of the government of Ontario. W. F. Hogart, Fort William, Ont., may be addressed.

**OCILLA SOUTHERN.**—An officer of this company, which operates a line from Fitzgerald, Ga., south to Alapaha, 26½ miles, and a branch to Irwinville, nine miles, writes that contracts are to be let soon for building an extension from Fitzgerald north to Macon, about 90 miles. E. Wilson, chief engineer.

**PACIFIC & PEACE RIVER.**—An officer writes that the plans call for building from Dunvegan, B. C., to Bella Coola, or to a point on Dean channel. It is undecided when the work will be carried out. J. A. Ritchie, Ottawa, Ont., may be addressed. (March 15, p. 526.)

**RICHMOND, URBANA & PENINSULA.**—An officer writes that this company is now operating an eight-mile line, has track laid on 12 miles, and is at work building a section of five miles between Richmond, Va., and Urbana. H. D. Eichelberger & Company are the contractors. The company expects to develop a traffic in farm products and lumber. John C. Robertson, president, and C. P. E. Burgwyn, chief engineer, Richmond, Va.

**ST. JOHN & OPHIR.**—Incorporated in Utah with \$150,000 capital, to build from St. John, in Tooele county, Utah, east to Ophir, 10 miles. The headquarters of the company are at Salt Lake City. J. R. Clark, president; C. L. Whittmore, vice-president, and W. H. Comstock, secretary and treasurer.

**STAMFORD & EASTERN.**—According to press reports this company will begin work at once on a line from Stamford, Tex., east to Fort Worth, about 160 miles. Judge W. T. Andrews, president; P. G. Burns, chief engineer, Stamford.

**TEXAS & PACIFIC.**—An officer writes that there will be some improvement work carried out in the yards at Fort Worth, Tex., but not a general remodeling of the yard. Plans have been made for the completion during 1912 of the double tracking work between Dallas and Fort Worth. This will necessitate laying about 12 miles of new track. C. H. Chamberlin, chief engineer, Dallas.

**UNION PACIFIC.**—An officer writes that grading and nearly all the bridge work has been finished on the extension of the Kearney branch from Callaway, Neb., to Stapleton, 37 miles, and that track laying is now in progress. R. L. Huntley, chief engineer, Omaha, Nebr.

**WINNIPEGOSIS & NORTHERN.**—Application has been made for a charter in the province of Manitoba, to build from a point in the Porcupine mountains near Steep Rock river east through township 43 in ranges 24, 25, 26 and 27 west of the principal meridian in Manitoba, crossing the Canadian Northern near Mafeking, thence to the west shore of Dawson bay on Lake Winnipegosis. The incorporators are B. A. Craig, McGregor Young, J. A. McEvoy, W. J. Rooney and G. F. Morrison, Toronto.

## RAILWAY STRUCTURES.

**AUSTIN, TEX.**—See Missouri, Kansas & Texas under Railway Construction.

**BRINKLEY, ARK.**—The St. Louis Southwestern, in connection with the Chicago, Rock Island & Pacific, is erecting a joint passenger station at an estimated cost of \$30,000.

**CLARENDON, ARK.**—The St. Louis Southwestern is erecting a brick and steel passenger station to cost approximately \$18,000, similar to one just completed at England, Ark. Confirmed.

**DURANGO, MEXICO.**—On the line now being built by the National Railways of Mexico from Durango west to Llano Grande,

a bridge is being built over the Rio Chico. The bridge is to be 701 ft. long and 208 ft. above the river. In the center there is to be a cantilever span 390 ft. long.

**GALVESTON, TEXAS.**—The Atchison, Topeka & Santa Fe has appropriated \$500,000 for a new office building.

**KANSAS CITY, MO.**—An officer of the Kansas City Terminal writes that a contract has been given to Fogel & Son, Kansas City, for putting up the McGee street freight sub-station at Kansas City. The building will be a two-story brick structure 56 ft. x 178 ft on concrete foundation, with steel frame and re-inforced concrete floors. The work will cost about \$6,000.

**LEWISBURG, PA.**—The Lewisburg Bridge Company has given a contract to the Pennsylvania Steel Company, at \$65,000, for the steel work for a bridge to be built over the river at St. John street. The new bridge will replace an old wooden structure.

**MACON, GA.**—Work is nearing completion on the freight terminal to be used jointly by the Southern Railway and the Georgia Southern & Florida and on April 15 the terminal will open for business. The joint terminal is in the center of the business district and consists of separate inbound and outbound freight warehouses, each 492 ft. long, together with two covered transfer platforms, and served by seven tracks accommodating 70 cars; cotton platform 250 ft. long; and team tracks for the delivery of bulk freight accommodating 100 cars.

**MONTREAL, QUE.**—An officer of the Grand Trunk writes that a contract has been given to the Dominion Bridge Company, Montreal, for 400 tons of structural steel for a steel bridge to be built on an old substructure over the Lachine canal. The contract amounts to \$45,000.

**NORFOLK, VA.**—Permission has been granted to the Norfolk & Western to build a new pier at Lamberts Point, just north of pier No. 1, which is to be removed. Permission has also been granted to the Virginia Railway & Power Company to extend the pier at the foot of Reeves avenue.

**PHILADELPHIA, PA.**—An officer of the Pennsylvania Railroad writes that plans have been made for putting up a new grain elevator at Girard Point.

**PHILADELPHIA, PA.**—The passenger station of the Baltimore & Ohio at Philadelphia, which fronts on the south side of Chestnut street, is to be connected with Market street, about 500 ft. farther north, by a covered walk, thus affording passengers convenient access to the trains of the Philadelphia subway. The contract for the construction of the walk, which will cost about \$15,000, has been let to the Roydhouse-Arey Company.

**PORTLAND, ME.**—An officer of the Grand Trunk writes that a contract has been given to the Pennsylvania Steel Company, Steelton, Pa., for 250 tons of structural steel for a single track bridge, 225 ft. long to be built over Back Cove at Portland. The improvements will cost \$70,000, including two new concrete piers and additions to the present pivot pier. (March 1, p. 409).

**ROCKPORT, TEX.**—The San Antonio, Rockport & Mexico, organized to build from San Antonio, Tex., to a point on the Rio Grande, with a branch to Rockport and to Harbor Island, has bought land at the latter place, it is said, as a site for terminals and warehouses. It is understood that the work is to be started in May, and that the cost will be about \$250,000.

**SOMERSET, KY.**—The Queen & Crescent has under consideration the question of putting up a new passenger station at Somerset.

**WATTS, OKLA.**—The Kansas City Southern expects to construct a six-stall roundhouse, a 90-ft. turntable, a machine shop, coaling plant, fuel oil plant, sandhouse and cinder pit, together with a yard having a capacity of about 700 cars.

In consequence of an agitation that has been carried over several parliamentary sessions respecting the uneconomical administration of the Russian railways, the minister of ways and communication has decided to draw up a series of regulations involving an examination of the railway credits on the model of the systems adopted by western European powers; and has sent the engineer, L. L. Elkin, abroad to visit the respective railway departments in order to have the necessary data on which to base the Russian project.

## Railway Financial News.

**ATCHISON, TOPEKA & SANTA FE.**—The Santa Fe system has appropriated \$22,700,000 for improvements for the coming year, which will be distributed as follows: \$5,700,000 will be expended for equipment; \$2,000,000 for double tracking the Coast lines; \$1,000,000 for terminal yards and improvements on the Colorado division; \$500,000 for a new office building at Galveston, and the balance in general improvements.

J. P. Morgan & Co. have sold the whole of the 50-year California-Arizona 4½ per cent. bonds which were put in their hands. These were first and refunding 4½ per cents. and the aggregate amount was \$9,394,000.

**CHICAGO, MILWAUKEE & ST. PAUL.**—The New York Stock Exchange has listed \$1,095,000 of the first mortgage bonds of the Chicago, Milwaukee & Puget Sound, due in 1949, making the total amount of these bonds listed \$26,095,000. These are 4 per cent. bonds guaranteed by the C. M. & St. P.

**DELAWARE, LACKAWANNA & WESTERN.**—This company jointly with the Syracuse, Binghamton & New York has applied to the New York Public Service Commission, Second district, to authorize the lease of the S. B. & N. Y. to the D. L. & W. until the year 2006, when the corporate existence of the S. B. & N. Y. will expire. This road constitutes the Lackawanna's line from Binghamton to Syracuse and is controlled by the Lackawanna by ownership of more than four-fifths of its stock. The application says that the stock of the S. B. & N. Y. has for some years past paid a dividend of 10 per cent. and that with a lease the economies which can be accomplished by the discontinuance of separate accounts will justify the agreement, which is proposed in the form of lease submitted, to pay 12 per cent. annually. Two-thirds of the stockholders of both corporations have approved the proposition; but objections have been filed; one holder of one hundred shares declares that the earnings of the S. B. & N. Y. warrant an annual dividend of at least 20 per cent. The commission will give a hearing at Albany, March 25.

**DENVER, NORTHWESTERN & PACIFIC.**—According to reports from Denver, the officers of this road have assurances from Kidder, Peabody & Company, of Boston, after an examination of the road by that firm, that the necessary funds will be raised to pay off outstanding notes amounting to \$3,500,000 and to make necessary improvements.

**GEORGIA & FLORIDA.**—The stockholders of this company at a special meeting have authorized the issue of 6 per cent. general mortgage bonds to the amount of \$2,000,000. It is understood that the bonds have already been underwritten. The proceeds will be used to pay off obligations for cars and engines, to retire the floating debt and to provide working capital.

**NEW YORK, NEW HAVEN & HARTFORD.**—The New York, Westchester & Boston, a subsidiary of the New Haven Company which within a few months will be opened for passenger traffic between New York and New Rochelle, has had listed on the New York Stock Exchange \$17,200,000 of its first mortgage 4½ per cent. bonds, series I, due in 1946. The company has authority at any time prior to the end of this year to issue \$2,900,000 more of these bonds. The bonds are guaranteed by the N. Y. N. H. & H.

**NORFOLK SOUTHERN.**—The New York Stock Exchange has listed \$5,837,000 of this company's first and refunding 5 per cent. bonds, series A, due in 1961.

**NORTHERN PACIFIC.**—The company has sold 4 per cent. prior lien bonds to the amount of \$4,613,000; and the total amount of these bonds now outstanding and listed on the New York Stock Exchange is \$107,028,500.

**PITTSBURGH, SUMMERVILLE & CLARION.**—The road, equipment and franchises of this company are advertised to be sold at sheriff's sale in Jefferson County, Pa., March 30. The road is leased to the Pennsylvania Southern, and the sale will be subject to a mortgage of which the Union Trust Co., of Pittsburgh, is trustee. The main line of the road extends from Summerville, Pa., on the Allegheny division of the Pennsylvania Railroad, about 100 miles northeast of Pittsburgh, to Clarion, Pa., 15 miles, with two short branches.

## ANNUAL REPORTS

## FORTY-THIRD ANNUAL REPORT, NEW YORK CENTRAL AND HUDSON RIVER RAILROAD COMPANY FOR THE YEAR ENDED DECEMBER 31, 1911.

## To the Stockholders of

## THE NEW YORK CENTRAL AND HUDSON RIVER RAILROAD COMPANY:

The Board of Directors herewith submits its report for the year ended December 31, 1911, with statements showing the results for the year and the financial condition of the company.

The mileage embraced in the operation of the road is as follows:

	Miles.
Main line and branches owned.....	805.49
Proprietary lines .....	3.06
Lines leased* .....	2,626.31
Lines operated under contract.....	81.70
Trackage rights .....	273.67
Total road operated .....	3,790.23

The increase of 5.20 miles in road mileage operated is due to the construction of a branch line on the Rome Watertown & Ogdensburg Railroad, running from Sanfords to a point on the Cape Vincent branch, forming a new route for freight traffic between Watertown and Sanfords.

The capital stock authorized is.....\$250,000,000.00  
of which there is issued and outstanding.....222,729,300.00

leaving a balance authorized but not issued of.....\$27,270,700.00

The mortgage, bonded and secured debt outstanding on December 31, 1910, was .....\$271,098,232.72  
This has been added to by the issue of three year gold notes due March 1, 1914, bearing interest at the rate of four and one-half per cent per annum.....30,000,000.00

\$301,098,232.72

and has been decreased by the payment of installments falling due during the year on this company's pro rata liability in connection with the certificates issued under equipment trust agreements, as follows:

Trust of 1907, installment due November, 1911..\$793,660.12  
Trust of 1910, installment due January, 1911... 433,964.42 1,227,624.54

Outstanding, as shown in the balance sheet of December 31, 1911 .....\$299,870,608.18

## SUMMARY OF FINANCIAL OPERATIONS AFFECTING INCOME.

	1911.	1910.	Increase or decrease.
OPERATING INCOME.	3,790.23	3,785.03	5.20
RAIL OPERATIONS.	miles operated.	miles operated.	miles.
Revenues .....	\$103,954,862.81	\$99,908,478.17	\$4,046,384.64
Expenses .....	74,472,578.24	74,079,086.58	393,491.66
NET REVENUE FROM RAIL OPERATIONS .....	\$29,482,284.57	\$25,829,391.59	\$3,652,892.98
Percentage of expenses to revenues .....	(71.63%)	(74.15%)	—(2.52%)
OUTSIDE OPERATIONS.			
Revenues .....	\$5,202,572.62	\$4,791,030.30	\$411,542.32
Expenses .....	4,881,096.79	4,909,808.90	—28,712.11
NET REVENUE FROM OUTSIDE OPERATIONS .....	\$321,475.83	.....	\$440,254.43
NET LOSS ON OUTSIDE OPERATIONS .....	.....	\$118,778.60	.....
NET REVENUE FROM ALL OPERATIONS .....	\$29,803,760.40	\$25,710,612.99	\$4,093,147.41
TAXES ACCRUED .....	5,447,759.13	4,697,826.30	749,932.83
OPERATING INCOME .....	\$24,356,001.27	\$21,012,786.69	\$3,343,214.58
OTHER INCOME.			
Joint facilities rents.....	\$1,754,125.34	\$1,451,212.04	\$302,913.30
Miscellaneous rents .....	309,579.61	319,527.90	—9,948.29
Dividends on stocks owned or controlled .....	11,649,589.23	11,150,915.74	498,673.49
Interest on funded debt owned .....	489,986.73	573,754.67	—83,767.94
Interest on other securities, loans and accounts .....	1,616,736.54	1,595,601.41	21,135.13
Miscellaneous income .....	416,162.50	355,321.51	60,840.99
TOTAL OTHER INCOME.....	\$16,236,179.95	\$15,446,333.27	\$789,846.68
GROSS CORPORATE INCOME..	\$40,592,181.22	\$36,459,119.96	\$4,133,061.26
DEDUCTIONS FROM GROSS CORPORATE INCOME.			
Rentals of leased lines.....	\$10,036,832.20	\$10,058,290.85	—\$21,458.65
Hire of equipment.....	1,151,064.87	972,557.08	178,507.79
Joint facilities rents.....	556,026.51	538,131.73	17,894.78
Miscellaneous rents .....	565,593.96	504,395.88	61,198.08
Separately operated properties—loss .....	210,693.02	.....	210,693.02
Interest on bonds .....	9,162,019.58	9,162,019.59	—.01

\*The Dunkirk Allegheny Valley and Pittsburgh Railroad, 90.51 miles, is also leased by this company, but its mileage and operations are not included in this report. Separate accounts are kept and independent returns prepared in its behalf.

	1911.	1910.	Increase or decrease.
Interest on three year gold notes of 1911.....	1,085,039.99	.....	1,085,039.99
Interest on equipment trust certificates .....	742,979.81	630,097.20	112,882.61
Other interest .....	76,749.96	80,848.89	—4,098.93
Equipment reserve .....	1,227,624.54	.....	1,227,624.54
St L & A Railway: interest, rental, etc. ....	138,600.00	74,000.00	64,600.00
N Y & Ottawa Railway: interest on bonds.....	58,240.00	58,240.00	.....
Other deductions .....	276,267.74	91,866.67	184,401.07
TOTAL DEDUCTIONS FROM GROSS CORPORATE INCOME..	\$25,287,732.18	\$22,170,447.89	\$3,117,284.29
NET CORPORATE INCOME...	\$15,304,449.04	\$14,288,672.07	\$1,015,776.97
DIVIDENDS, four each year: 5% in 1911; 6% in 1910..	11,136,465.00	13,363,758.00	—2,227,293.00
SURPLUS FOR THE YEAR....	\$4,167,984.04	\$924,914.07	\$3,243,069.97
Appropriation for additions and betterments .....	.....	924,914.07	—924,914.07
Appropriation to cover replacement value of abandoned property including buildings at Grand Central Terminal, etc. ....	2,500,000.00	.....	2,500,000.00
BALANCE FOR YEAR CARRIED TO PROFIT AND LOSS.....	\$1,667,984.04	.....	\$1,667,984.04

NOTE: Decrease designated by minus sign, —.

Balance to credit of profit and loss (free surplus) December 31, 1910 .....\$12,337,616.37  
Surplus for the year 1911.....1,667,984.04

## Additions for the year:

Interest on investment in Rutland stock to December 31, 1910 .....	\$355,845.72	
New York & Putnam Railroad Company first consolidated mortgage bonds.....	38,000.00	
Refund of deposits account New York & Northern Railway Company .....	1,907.61	395,753.33
		\$14,401,353.74

## Deductions for the year:

Commission and discount, three year gold notes .....	\$349,500.00	
Adjustments Western Union Telegraph Company accounts prior to 1911.....	147,014.79	
Adjustments Pullman Company accounts prior to 1911 .....	33,404.03	
Clearfield Bituminous Coal Corporation advances, interest, deficit, etc.....	254,912.75	
Settlement Canadian Pacific Ry for St L & A Ry proportion of property and facilities at Montreal, twenty months prior to March 1, 1910 .....	90,000.00	
Sundry uncollectible accounts and adjustments .....	77,853.84	952,685.41

BALANCE TO CREDIT OF PROFIT AND LOSS (FREE SURPLUS) DECEMBER 31, 1911.....\$13,448,668.33

For the year covered by this report the revenue from transportation was \$102,550,898.26, an increase of \$3,865,153.51; revenue from operations other than transportation was \$1,403,964.55, an increase of \$181,231.13; revenue from outside operations (connected with, but in addition to transportation by rail) was \$5,202,572.62, an increase of \$411,542.32.

The total gross revenue from all operations was \$109,157,435.43, an increase of \$4,457,926.96.

Revenues from transportation from all the principal sources have shown an increase.

Freight revenue was \$61,133,309.92, an increase of \$2,722,075.78. The revenue freight carried amounted to 48,250,535 tons, an increase of 1,183,696 tons over last year, and 828,381 tons over 1907, which had the highest previous record as to tonnage. Twenty-four commodities named in the classified list show increases, and fifteen show decreases; the tonnage for each group, except products of forests, is greater than it was in 1910. The notable increases are in grain, 457,939 tons, hay, 113,895 tons, fruit and vegetables, 142,202 tons, dressed meats and other packing-house and dairy products, 214,379 tons, anthracite coal, 644,310 tons, and manufactured articles, 115,792 tons. The commodities which have been moved in smaller quantities than in the previous year are bituminous coal, 182,720 tons, coke, 152,972 tons, ores, 216,804 tons, castings and machinery, 142,331 tons, and bar and sheet metal, 78,371 tons. The average revenue per ton of all freight carried is \$1.27, an increase of three cents per ton, due to the greater quantities of high class freight and the smaller tonnage of medium and low class commodities.

The revenue from passengers amounted to \$31,759,237.98, an increase of \$766,382.27. There was an increase in the number of local and commutation passengers carried, and in the average amount received from each passenger and the average revenue per passenger per mile.

The total revenue of all passenger-train transportation was \$39,638,528.43, an increase of \$1,056,976.12 over the year 1910. Of this amount the revenue from express traffic was \$4,202,777.42, an increase of \$80,493.91 over the year 1910, due to an enlarged volume of business.

The expenses of rail operations amounted to \$74,472,578.24, an increase of \$393,491.66 equal to fifty-three one-hundredths of one per cent while

the increase in revenues from rail operations was over four per cent.

The operating expenses, by groups, were:

Maintenance of way and structures.....	\$13,723,709.20, a decrease of \$336,468.63
Maintenance of equipment.....	16,911,146.39, a decrease of 25,106.85
Traffic expenses.....	2,180,206.49, a decrease of 307,021.25
Transportation expenses.....	38,935,030.94, an increase of 996,504.19
General expenses.....	2,722,485.22, an increase of 65,584.20
Outside operations.....	4,881,096.79, a decrease of 28,712.11

The ratio of rail operating expenses to the total revenues for the year was 71.63% as compared with a ratio of 74.15% in the year 1910, due to the enforcement of the most rigid economy in all departments, unremitting surveillance of all channels of expenditure, and to improved appliances, especially in motive power. Economy in operation has been effected on the Pennsylvania division by the installation of twenty-six Mallet articulated compound locomotives. The improved character of the equipment in service is indicated by the following figures:

Freight locomotive mileage increased.....	71,764 miles
Freight train mileage increased.....	250,860 miles
Freight car mileage increased.....	50,855,079 miles

of which 16,735,072 was the increase in loaded freight car mileage.

Passenger locomotive mileage decreased.....	743,326 miles
Passenger train mileage decreased.....	348,800 miles
Passenger car mileage increased.....	2,123,790 miles

The latter item represents a decrease of 1,132,042 in the mileage of ordinary passenger-train cars, due to the annulment of unremunerative trains: an increase of 560,360 Pullman car miles, due to the increase in through business; and an increase of 2,695,472 miles made by principally express and milk train cars, caused by the greater volume of such business.

In addition to the current requirements for maintenance of way, a large amount of renewal and improvement work has been done. Creosoted ties, mostly of yellow pine, expected to give much longer service than the ordinary untreated ties, have been laid for the first time, during the year 1911, to the number of 710,570. The average price of ties this year was 77.3 cents as against 68.4 cents last year. There were 49,317 tons of 100-lb. new steel rail, at an average price of \$30.59 per ton, and 27,951 tons of new 80-lb. rail, at an average price of \$29.95 per ton, laid during the year; an excess of 5,000 tons over 1910, the price in each case being higher than that of the previous year. The installation of the most modern type of automatic signal apparatus has resulted in a decreased cost of up-keep.

In the maintenance of equipment group, notwithstanding an increase of \$121,775.87 to cover retirements, a total decrease of \$25,106.85 is shown. This is partly due to a change in the method of accounting for improvements, and partly to the fact that the equipment has been kept at a high standard of efficiency, resulting in a decrease in charges for repairs.

Traffic expenses, being those charges incurred in soliciting and procuring traffic, outside of its actual movement by rail, amounted to \$2,180,206.49, a reduction of \$307,021.25, due to a change in the method of treating the deficit of the Merchants Despatch Transportation Company and to the decreased charges for advertising.

The cost of transportation shows large increases in those items representing cost of labor, in consequence of the higher rates of pay which went into effect in the spring of 1910 and the deferred arbitration award effective January 1, 1911. Increases of this class of expense amounted to the sum of \$507,000, out of a total increase in transportation expenses of \$996,504.19.

General expenses show an increase of \$65,584.20, of which \$26,531.72 represents the increased amount paid for pensions to retired employees.

In outside operations there was a net revenue of \$321,475.83. Ferry lines, harbor terminal transfers, and dining and special car service showed a diminution in the deficits of last year of \$198,976.25; and electric light and power plants, grain elevators, stock yards, station restaurants, and freight storage plants produced an increased surplus of \$251,600.55.

Taxes have increased \$749,932.83, of which \$473,044.67 is due to the settlement of disputed special franchise taxes levied on property in the City of New York, mostly in connection with the use of Park Avenue. The federal tax on the income of corporations amounted to \$129,183.23, as against \$150,564.54 in 1910, but a large amount of the payments in both years was made under protest, and suits have been brought to recover the amounts paid on account of leased lines under the claim that they are not liable to this tax.

In deductions from gross corporate income, rentals of leased lines show a decrease of \$21,458.65. There was an increase in the rental of the Boston and Albany Railroad, due to the inclusion in this year's accounts of a full year's interest on the improvement bonds of 1910, as against two months' charges in last year. There was a decrease of \$66,458.32 in the rental of the Dunkirk Allegheny Valley and Pittsburgh Railroad, due to the substitution, on February 1, 1911, of a first mortgage bond for \$2,900,000, bearing interest at the rate of 4½%, for a like amount of bonds of various kinds on which 7% interest was paid. Interest on obligations of this company increased \$1,085,039.99, being the amount of interest on three year gold notes amounting to \$30,000,000, issued March 1, 1911. Loss on separately operated properties caused an increase in deductions from income of \$210,693.02, being the amount of this company's proportion of the annual guarantee to the Merchants Despatch Transportation Company and the loss on the operation of the Dunkirk Allegheny Valley and Pittsburgh Railroad for the year. An amount of \$1,227,624.54 has been charged against income for the year, covering the amount of installments paid on equipment trust certificates of 1907 and 1910. A dividend of 4% was paid on the capital stock of the St Lawrence and Adirondack Railway Company, accounting for an increase in deductions from income of \$64,600, which amount, however, is included in this company's income as dividend on stocks owned and does not affect the final result.

The rate of dividend for the year amounted to 5%, as against 6% for the year 1910, the decrease in the amount paid being \$2,227,293.

The surplus for the year, after paying dividends, amounted to \$4,167,984.04, an increase of \$3,243,069.97 over last year. Of this surplus the sum of \$2,500,000 was set aside by the Directors as a fund to cover the replacement value of property abandoned prior to 1911, mainly in connection with the improvements at the Grand Central Terminal.

Expenditures for additions and betterments to the property of this company during the year were,

Expenditures on road account.....	\$5,851,806.23
Additional trust equipment.....	3,714,648.51
	\$9,566,454.74
Credit value of equipment retired.....	\$3,333,827.47
Expenditures on equipment account.....	1,563,415.99
Credit balance to equipment replacement fund	\$1,770,411.48

Amount to equal equipment trust installments	1,227,624.54	2,998,036.02
--	--------------	--------------

making a net addition to this company's property account of. \$6,568,418.72  
Expenditures on account of construction work  
on leased lines amounted to the sum of.....\$10,068,342.11  
Less valuation of abandoned property..... 2,264,328.30

a net charge to leased lines construction of..... \$7,804,013.81

making a grand total of extraordinary expenditures during the year of ..... \$14,372,432.53

details of which are shown on subsequent pages.

The operation by electricity of multiple unit trains was extended in November to Tarrytown on the Hudson River division.

The Grand Central Terminal improvements, have on the whole, progressed satisfactorily, although delays in receipt of structural steel and a strike in the marble trade have somewhat retarded the completion of the work. The office building immediately to the north of the concourse is practically completed and the majority of the offices are occupied. The Merchants and Manufacturers loft building has been completed and occupied since the early part of the year. The new building for the Adams Express Company is nearly finished and will be ready for occupancy by March 1, 1912. All the buildings on the site of the old Grand Central Station and the temporary building erected for the use of the Post Office Department between 43rd and 44th Streets and Madison and Vanderbilt Avenues, have been demolished. Some of the cross streets have been opened for traffic and all of them are expected to be in use by the end of the year 1912. The Grand Central Terminal is expected to be finished and the waiting rooms, ticket offices and concourse opened to the use of the public by the end of 1912. Arrangements have been completed with the City of New York for the alteration of Vanderbilt Avenue and the closing of Depew Place as a public street. During the year several tracks on the main level of the Terminal have been placed in service and the entire mail business has been transferred to the lower, or suburban, level. Nearly all of the American Express business has been removed from the Terminal territory and is being handled in the new premises on Eleventh Avenue.

There was issued by consent of the Public Service Commission of the Second District of the State of New York, \$30,000,000 gold notes due March 1, 1914, bearing interest at the rate of four and one-half per cent per annum, the proceeds to be used for reimbursement of expenditures already made on improvements to property of this company and for advances for construction purposes to lessor companies; for acquisition of lands and for additions and betterments to property of this company and several of its leased lines and for work in connection with the Grand Central Terminal improvements.

One half of this company's holding of the capital stock of the Rutland Railroad Company was sold to the New York New Haven and Hartford Railroad Company, (or associated interests), and an agreement made for the sale to it of the other half, subject to the approval of the Public Service Commission of the State of New York, which has not yet been given.

Application has been made to the Public Service Commission of the State of New York for leave to purchase capital stock of the New York Ontario and Western Railway Company, but that application is still pending.

Under date of December 1, 1911, The New York Central and Hudson River Railroad Company, together with The Lake Shore and Michigan Southern Railway Company, The Michigan Central Railroad Company and The Cleveland Cincinnati Chicago and St Louis Railway Company, became parties to an equipment trust agreement for the purpose of establishing the New York Central Lines Equipment Trust of 1912. Subsequently the Chicago Indiana and Southern Railroad Company also became a party thereto. This agreement provides for an issue of \$15,000,000 of equipment trust certificates bearing interest at four and a half per cent per annum, being ninety per cent of the total cost of the equipment to be furnished under the terms of said agreement. The certificates are to be paid in fifteen annual installments of \$1,000,000 each, the first installment being payable January 1, 1913. The cost of the equipment to be assigned to this company will be approximately \$7,950,000, and the pro rata amount of certificates representing ninety per cent of the cost will be approximately \$7,155,000. Full particulars as to the character of the equipment to be acquired will be set forth in the report to the stockholders for 1912.

An agreement was made between this Company and the New York New Haven and Hartford Railroad Company for the establishment of through routes via the Boston and Albany Railroad and whereby the companies agreed to co-operate in building up and increasing the business over that line. The two companies are to share equally in the net results of the operation of the Boston and Albany while the agreement remains in force. This arrangement became effective on July 1, 1911, and is to continue for a period of ten years, and thereafter subject to termination by either party on one year's notice.

Trackage rights have been granted to the New York New Haven and Hartford Railroad Company between Pittsfield and North Adams and between Boston and Ashland, South Framingham and Newton Highlands, with the use of station facilities at Trinity Place and Huntington Avenue.

The Public Service Commission of the State of New York granted this company permission to purchase the whole or any part of the capital stock of the New York and Harlem Railroad Company amounting to \$10,000,000 for \$175 a share of the par value of \$50 and to issue for the purpose of such acquisition \$35,000,000 in thirty year four per cent debentures, and to use, for the same purpose, \$5,000,000 of the money received from the issue of the gold notes of March 1, 1911. Pending the advantageous sale of these debentures this company received permission to issue four and one-half per cent notes maturing in not more than three years from their respective dates, not to exceed at any one time the sum of \$30,000,000, to be redeemed at or before maturity out of the proceeds of the thirty year debentures above mentioned, the intention being that not more than \$35,000,000 of the par value of the debentures and notes shall be outstanding at any one time.

By the action of the Board of Directors on December 6, 1911, the holders of this company's Lake Shore Collateral bonds and Michigan Central Collateral bonds have been requested to consent to the consolidation of the Lake Shore and Michigan Southern Railway Company with The New York Central and Hudson River Railroad Company.

This company together with The Lake Shore and Michigan Southern Railway Company, The Michigan Central Railroad Company, The Cleveland Cincinnati Chicago and St Louis Railway Company, The Pittsburgh and Lake Erie Railroad Company, The Lake Erie and Western Railroad Company, Chicago Indiana and Southern Railroad Company, Rutland Railroad Company, The New York Chicago and St Louis Railroad Company, The Toledo and Ohio Central Railway Company, and The Zanesville and West-

ern Railway Company entered into an agreement with The Pullman Company dated April 1, 1911, under which that company is to furnish cars of steel construction to replace the wooden cars operating over the lines of the companies named, the delivery to be at the rate of approximately thirty cars a month. The effect of this agreement will be that by the end of July, 1912, all sleeping cars on the New York Central Lines will be of steel construction.

The Board of Directors on June 5, 1911 appointed James H. Hustis, who had been in charge of the operation of the Boston and Albany Railroad under the title of Assistant General Manager, to be a Vice President of The New York Central and Hudson River Railroad Company, with offices in Boston.

The following appointments also were made during the year:

April 1, Sidney B. Wight, General Purchasing Agent; April 1, William C. Bower, Purchasing Agent; April 1, Frank V. Whiting, General Claims Attorney; May 1, George H. Alexander, Superintendent of Car Service.

Appreciative acknowledgment is made of the faithful, efficient performance of duty of employees in every department of the service during the year.

WILLIAM C. BROWN,  
President.

#### TRAFFIC STATISTICS.

FREIGHT.	1911.	1910.	Increase or Decrease.
Tons of revenue freight carried .....	48,250,535	47,066,839	1,183,696
Tons of company freight carried .....	7,751,641	7,964,088	-212,447
Total tons of freight carried..	56,002,176	55,030,927	971,249
Tons of revenue freight carried one mile.....	9,660,523,688	9,276,710,584	383,813,104
Tons of company freight carried one mile .....	1,316,028,414	1,299,708,232	16,320,182
Total tons of freight carried one mile .....	10,976,552,102	10,576,418,816	400,133,286
Miles of road operated in freight service .....	3,775.27	3,770.07	5.20
Tons of revenue freight carried one mile per mile of road .....	2,558,896	2,460,620	98,276
Tons of all freight carried one mile per mile of road.....	2,907,488	2,805,364	102,124
Average distance haul of one ton of revenue freight.....	200.22	197.10	3.12
Average distance haul of one ton of all freight .....	196.00	192.19	3.81
Average number of tons of revenue freight per train mile.	429.86	417.25	12.61
Average number of tons all freight per train mile.....	488.42	475.71	12.71
Average number of tons of revenue freight per loaded car mile .....	17.03	16.85	.18
Average number of tons all freight per loaded car mile.	19.35	19.22	.13
Average number of freight cars per train mile.....	38.70	36.83	1.87
Average number of loaded cars per train mile.....	25.24	24.76	.48
Average number of empty cars per train mile.....	12.45	11.06	1.39
Total freight revenue.....	\$61,133,309.92	\$58,411,234.14	\$2,722,075.78
Average amount received for each ton of freight.....	\$1.27	\$1.24	\$0.03
Average revenue per ton per mile .....	mills 6.33	mills 6.30	mills 0.03
Average revenue per mile of road .....	\$16,193.10	\$15,493.41	\$699.69
Average revenue per train mile .....	\$2.72	\$2.63	\$0.09

#### PASSENGER.

Number of interline passengers carried .....	3,227,200	3,250,458	-23,258
Number of local passengers carried .....	30,834,956	30,443,833	391,123
Number of commutation passengers carried .....	15,250,951	14,670,654	580,297
Total number of revenue passengers carried .....	49,313,107	48,364,945	948,162
Total number of revenue passengers carried one mile...	1,795,954,782	1,770,667,550	25,287,232

PASSENGER (Continued).	1911.	1910.	Increase or Decrease.
Miles of road operated in passenger service .....	3,497.26	3,497.26	.....
Number of revenue passengers carried one mile per mile of road .....	513,532	506,301	7,231
Average distance each revenue passenger carried .....	36.42	36.61	-.19
Average number of passengers per train mile .....	68	66	2
Average number of passengers per car mile .....	16	16	.....
Average number of passenger cars per train mile.....	6	6	.....
Total passenger revenue.....	\$31,759,237.98	\$30,992,855.71	\$766,382.27
Average amount received from each passenger .....	cents 64.40	cents 64.08	cents 0.32
Average revenue per passenger per mile .....	cents 1.768	cents 1.750	cents 0.018
Total passenger service train revenue .....	\$39,638,528.43	\$38,581,552.31	\$1,056,976.12
Average passenger service train revenue per mile of road...	\$11,334.17	\$11,031.94	\$302.23
Average passenger service train revenue per train mile.....	\$1.51	\$1.45	\$0.06

#### TOTAL TRAFFIC.

Operating revenues .....	\$103,954,862.81	\$99,908,478.17	\$4,046,384.64
Operating expenses .....	74,472,578.24	74,079,086.58	393,491.66
Net operating revenue .....	\$29,482,284.57	\$25,829,391.59	\$3,652,892.98
Operating revenues per mile of road .....	\$27,427.06	\$26,395.69	\$1,031.37
Operating expenses per mile of road .....	19,648.56	19,571.60	76.96
Net operating revenue per mile of road .....	\$7,778.50	\$6,824.09	\$954.41
Operating revenues per train mile .....	\$2.13	\$2.04	\$0.09
Operating expenses per train mile .....	1.53	1.51	0.02
Net operating revenue per train mile .....	\$0.60	\$0.53	\$0.07

NOTE: Decrease designated by minus sign, —.

#### CONDENSED GENERAL BALANCE SHEET, DECEMBER 31, 1911.

Assets.	
Property owned as investment:	
Physical property owned .....	\$261,883,863.21
Securities owned .....	131,621,727.82
Other permanent investments.....	52,696,847.99
Total property owned as investment.....	\$446,202,439.02
Working assets:	
Cash .....	\$10,714,189.19
Marketable securities .....	28,831,272.67
Loans and bills receivable .....	33,684,177.07
Net traffic, car mileage and per diem balance .....	4,143,760.53
Net balance due from agents and conductors .....	3,660,793.73
Miscellaneous accounts receivable.....	6,734,442.45
Materials and supplies .....	8,713,817.86
Unmatured interest, dividends and rents receivable .....	3,056,441.58
Deferred debit items .....	20,481,025.49
Total assets .....	\$566,222,359.59
Liabilities.	
Stock:	
Capital stock, common .....	\$222,724,400.00
Consolidation certificates .....	4,900.00
Mortgage, bonded and secured debt.....	299,870,608.18
Working liabilities .....	18,443,221.54
Accrued liabilities not due.....	6,757,596.87
Deferred credit items .....	2,928.00
Appropriated surplus .....	4,970,036.67
Free surplus, Profit and loss.....	13,448,668.33
Total liabilities .....	\$566,222,359.59

#### FORTY-SECOND ANNUAL REPORT, LAKE SHORE AND MICHIGAN SOUTHERN RAILWAY COMPANY; FOR THE YEAR ENDED DECEMBER 31, 1911.

To the Stockholders of

THE LAKE SHORE AND MICHIGAN SOUTHERN RAILWAY COMPANY:

The Board of Directors herewith submits its report for the year ended December 31, 1911, with statements showing results for the year and the financial condition of the company.

The mileage embraced in the operation of the road is as follows:

	Miles.
Main line and branches.....	871.00
Proprietary lines .....	289.32
Leased lines .....	424.67
Trackage rights .....	190.44
Total road operated .....	1,775.43

The increase of 112.55 miles in mileage operated is caused by the acquisition of rights over the Lake Erie and Pittsburgh Railway, Pennsylvania and Baltimore and Ohio Railroad Companies' tracks, and by the use of the Cleveland Short Line Railway. This is a decrease of mileage in main line and branches of .03 miles due to elimination of curves. The net total increase in mileage over 1910 is 112.52 miles.

There was no change in capital stock during the year, the amount authorized and outstanding December 31, 1911, being \$50,000,000.00.

The funded debt outstanding on December 31, 1910, was \$163,817,779.79. It has been increased during the year by the issue and sale of twenty-five year four per cent gold bonds of 1906, being the remainder of the total authorized issue of \$50,000,000.00

\$570,000.00  
\$169,537,779.79

Funded debt (brought forward).....	\$169,537,779.79
It has been decreased during the year by the payment of the company's pro-rata of installments on equipment trust certificates as follows:	
January 1, First installment 1910 trust....	\$918,071.04
November 1, Fourth installment 1907 trust. 447,226.18	1,365,297.22
Total funded debt December 31, 1911.....	\$168,172,482.57

## SUMMARY OF FINANCIAL OPERATIONS AFFECTING INCOME.

	1911.	1910.	Increase or decrease.
OPERATING INCOME.	1,775.43	1,662.91	112.52
RAIL OPERATIONS.	miles operated.	miles operated.	miles operated.
Revenues .....	\$48,360,997.13	\$49,420,210.99	—\$1,059,213.86
Expenses .....	31,078,577.87	34,920,932.90	—3,842,355.03
NET REVENUE FROM RAIL OPERATIONS .....	\$17,282,419.26	\$14,499,278.09	\$2,783,141.17
Percentage of expenses to revenues .....	(64.26%)	(70.66%)	—(6.40%)
OUTSIDE OPERATIONS.			
Revenues .....	\$577,657.87	\$559,376.73	\$18,281.14
Expenses .....	608,734.97	609,092.28	—357.31
NET DEFICIT FROM OUTSIDE OPERATIONS .....	\$31,077.10	\$49,715.55	—\$18,638.45
NET REVENUE FROM ALL OPERATIONS .....	\$17,251,342.16	\$14,449,562.54	\$2,801,779.62
TAXES ACCRUED .....	1,673,939.54	1,720,182.33	—46,242.79
OPERATING INCOME .....	\$15,577,402.62	\$12,729,380.21	\$2,848,022.41
OTHER INCOME.			
Hire of equipment.....	\$157,555.78	\$383,818.19	—\$226,262.41
Joint facilities rents.....	336,426.83	350,446.54	—14,019.71
Miscellaneous rents .....	137,904.57	70,209.43	67,695.14
Dividends on stocks owned or controlled .....	7,878,679.77	7,755,013.50	123,666.27
Interest on funded debt owned .....	288,623.75	164,946.87	123,676.88
Interest on other securities, loans and accounts.....	845,556.19	1,005,914.11	—160,357.92
Miscellaneous income .....	579,468.76	721,738.05	—142,269.29
TOTAL OTHER INCOME.....	\$10,224,215.65	\$10,452,086.69	—\$227,871.04
GROSS CORPORATE INCOME..	\$25,801,618.27	\$23,181,466.90	\$2,620,151.37
DEDUCTIONS FROM GROSS CORPORATE INCOME.			
Rentals of leased lines.....	\$2,531,081.50	\$2,268,573.56	\$262,507.94
Joint facilities rents.....	449,678.61	336,967.81	112,710.80
Miscellaneous rents .....	5,173.90	8,122.88	—2,948.98
Interest on bonded debt....	5,724,812.45	5,454,783.05	270,029.40
Interest on equipment trust certificates .....	842,993.60	542,595.54	300,398.06
Other interest .....	563,963.49	410,222.83	153,740.66
Dividend on guaranteed stock .....	96,030.00	96,030.00	.....
Equipment reserve .....	1,365,297.22	.....	1,365,297.22
Other deductions .....	49,252.18	277,135.80	—227,883.62
TOTAL DEDUCTIONS FROM GROSS CORPORATE INCOME..	\$11,628,282.95	\$9,394,431.47	\$2,233,851.48
NET CORPORATE INCOME..	\$14,173,335.32	\$13,787,035.43	\$386,299.89
DIVIDENDS (18% in each year)	8,903,970.00	8,903,970.00	.....
SURPLUS FOR THE YEAR....	\$5,269,365.32	\$4,883,065.43	\$386,299.89
1910 installments on 1907 and 1910 trust equipment.....	.....	1,365,297.22	—1,365,297.22
BALANCE TO CREDIT OF PROFIT AND LOSS .....	\$5,269,365.32	\$3,517,768.21	\$1,751,597.11

NOTE: Decrease designated by minus sign, —.

Amount to credit of profit and loss (free surplus, December 31, 1910 .....	\$29,721,219.05
Balance to credit of profit and loss for the year 1911.....	5,269,365.32
	\$34,990,584.37
Add:	
Amount received from Chicago and North Western and Chicago, Milwaukee and St. Paul Railway Companies account proportion deficit of Indiana Harbor Belt Railroad Company to December 31, 1910.....	\$245,545.73
Increasing value of Indiana Harbor Belt Railroad Company stock to par.....	1,224,998.00
Adjustment with Pittsburgh and Lake Erie Railroad Company account one half operating profit of Pittsburgh, McKeesport and Youghiogheny Railroad for years 1909 and 1910....	438,092.79
	\$36,899,220.89
Deduct:	
Discount on \$5,720,000.00 gold bonds of 1906. \$457,157.50	
Value of property at Ashtabula and other locations abandoned during the year.....	209,538.45
Net loss in adjustment of sundry accounts....	77,901.59
	744,597.54
Balance to credit of profit and loss (free surplus), December 31, 1911 .....	\$36,154,623.35

The operating revenues for the year were \$48,360,997.13, a decrease of \$1,059,213.86 as compared with the previous year.

Revenue derived from the transportation of freight amounted to \$31,101,334.62, a decrease of \$1,545,200.90, almost wholly attributable to unsettled business conditions. Among the commodities carried bituminous coal shows a decrease of 576,594 tons, coke 438,965 tons, ores 1,673,771 tons, and bar and sheet metal 128,671 tons.

Passenger revenue was \$11,350,095.67, an increase of \$219,970.89. There

were 110,061 more local and interline passengers carried, and the revenue per passenger was one cent greater than in the previous year.

Revenue from transportation of mails was \$2,178,633.63, an increase of \$54,419.52. Contracts regulating the compensation allowed for the transportation of mails for the past four years, expired on June 30 last, at which time the Post Office Department completed a reweighing of the mails, resulting in an increased compensation to the company. Subsequently the Post Office Department inaugurated the transportation of magazines and periodicals by freight and on September 1, withdrew from mail service and transferred to freight service a heavy tonnage of these magazines and periodicals and on that date started another reweighing of the mails, the result of which was a reduction in the compensation to be allowed, to an amount about equal to that which existed prior to June 30, hence the company received the increased compensation for only two months, viz: July and August.

Revenue from express traffic was \$1,745,935.84, an increase of \$96,593.01. Revenue from excess baggage and milk was \$210,556.49, an increase of \$6,398.12.

Other passenger train revenue amounted to \$555,262.27, an increase of \$69,995.34, due principally to greater patronage of limited trains, resulting in a larger collection of excess fares.

Switching, special service train and miscellaneous transportation revenues amounted to \$717,767.64, an increase of \$38,119.31.

Revenues other than from transportation were \$501,410.97, an increase of \$490.85.

The operating expenses for the year amounted to \$31,078,577.87, a decrease of \$3,842,355.03. By groups they were as follows:

	Decrease.	Per Cent.
Maintenance of way and structures.....	\$6,178,623.31	18.03
Maintenance of equipment.....	6,704,095.72	14.85
Traffic expenses .....	1,026,317.29	11.00
Transportation expenses .....	16,245,052.22	6.87
General expenses .....	924,489.33	2.43

\*Increase.

Retrenchments in expenditures for maintenance of way and structures were made during the latter half of the year, but curtailing the work of rebalancing main line track with stone and by reduction in outlay for repairs and renewals of bridge structures and buildings and fixtures. There was a heavy charge to maintenance during 1910 in completing change of line from left to right hand running, with no corresponding expense during the year 1911.

There was a decrease in practically all maintenance of equipment items, principally due to the large amount of equipment out of service during the year with a consequent reduction in charges for repairs, and to a lesser number of old locomotives and cars retired from service.

The decrease in traffic expenses is due to a reduction in freight tariff publications and elimination of the charge to "Fast freight lines" of the company's proportion of the deficit of the Merchants' Despatch Transportation Company, which this year is shown under "Deductions from income."

In transportation expenses there are decreases in nearly all items affected by the volume of train service, by reason of a falling off in freight traffic and a greater number of tons hauled per train, resulting in a reduced train mileage.

The increase in general expenses is due to payments made by the company during the year to a larger number of superannuated employees under the pension rules and to increased legal expenses.

Outside operations show a decreased loss for the year of \$18,638.45, principally due to increased revenues derived from dining car service and commercial ice supply plants.

Taxes accrued amounted to \$1,673,939.54, a decrease of \$46,242.79.

Other income for the year was \$10,224,215.65, a decrease of \$227,871.04 as compared with the previous year, caused by changing the method of settlement between system lines for freight car hire from a per diem to a mileage basis, effective January 1, resulting in less revenue; and also a smaller return in interest on notes, owing to liquidation of promissory notes of The Cleveland Short Line Railway Company and The Lake Erie and Pittsburgh Railway Company.

Deductions from gross corporate income were \$11,628,282.95, an increase of \$2,233,851.48 as compared with the previous year, attributable to the following causes:

Rental of leased lines increased \$262,507.94, owing to the terms of the agreement for the use of the Cleveland Short Line Railway.

Joint facilities and miscellaneous rents increased \$109,761.82, on account of payments for additional trackage acquired during the year as more fully referred to hereinafter.

Interest on equipment trust certificates increased \$300,398.06, a full year's interest having been accrued on the company's pro-rata of the equipment trust certificates of 1910, as against a partial year's accrual in the previous year.

Interest on bonded debt increased \$270,029.40, through the issuance during the year of \$5,720,000.00 gold bonds of 1906, with attending accrual of interest thereon.

Other interest increased \$153,740.66, principally due to additional one year French notes issued by the company during the year.

Equipment reserves increased \$1,365,297.22, being the amount equivalent to the year's installments on account of 1907 and 1910 equipment trusts and included as a deduction from income, whereas in 1910 the same amount was deducted from surplus.

Other deductions decreased \$227,883.62. There was a reduction of \$277,135.80, caused by the discontinuance on December 31, 1910, of contributions by the company toward the deficit of the Indiana Harbor Belt Railroad Company. This reduction was partially offset by an increase of \$49,252.18 in "Separately operated properties—loss", due to the transfer to that account of the company's proportion of Merchants' Despatch Transportation Company deficit heretofore included in traffic expenses.

From the net corporate income of the company for the year, amounting to \$14,173,335.32, there were paid three dividends aggregating 18 per cent or \$8,903,970.00, leaving a surplus for the year of \$5,269,365.32.

Additions and betterments to the property during the year were \$2,722,976.80, the full amount of which was charged direct to capital account. The detail of such expenditures will be found on a following page.

The company as owner of the entire outstanding capital stock of The Cleveland Short Line Railway Company, entered into an agreement and lease on April 1, 1911, whereby it acquired the right to use the railroad and properties of The Short Line Company, extending from Rockport to Collinwood, Ohio, forming a belt line around the City of Cleveland. That part of the line from Rockport to Marcy, Ohio, a distance of 10.08 miles, is being operated in connection with the Lake Erie and Pittsburgh Railway, while the line from Marcy to Collinwood, Ohio, is still under construction. As rental The Lake Shore and Michigan Southern Railway Company agrees to pay an amount equivalent to five per cent per annum on outstanding capital stock and interest on outstanding obligations of that company. Further, it is to pay all taxes and assessments and to keep and maintain,

at its own expense, the railroad and properties leased and is to receive all revenues derived from the operation thereof.

The Lake Erie and Pittsburg Railway, extending from Marcy to Brady's Lake Junction, Ohio, a distance of 27.84 miles, was opened for operation on October 15, 1911, at which time through freight service was established by The Lake Shore and Michigan Southern Railway Company over that road. The Lake Erie and Pittsburg Railway was constructed under an agreement dated January 10, 1908, between The Lake Shore and Michigan Southern Railway Company, the Pennsylvania Company and The Lake Erie and Pittsburg Railway Company, under the terms of which the two former companies agreed to advance funds for construction in equal proportions. Upon completion of the road, The Lake Erie and Pittsburg Railway Company issued its securities in reimbursement for the advances made, and control of the property is now held equally by The Lake Shore and Michigan Southern and Pennsylvania Companies through ownership of stock. Under the conditions of the agreement hereinbefore referred to, the two owning companies will each pay one-half of an amount equivalent to five per cent per annum on the outstanding stock, and interest on outstanding obligations of The Lake Erie and Pittsburg Railway Company, in consideration of which The Lake Shore and Michigan Southern Railway Company and The Pennsylvania Company have equal rights for the operation of their trains over the tracks of The Lake Erie and Pittsburg Railway.

In connection with the opening of The Lake Erie and Pittsburg Railway, trackage rights were acquired over the tracks of the Pennsylvania Company between Brady's Lake Junction and Minerva, Ohio, which gives the company a direct connection with the Lake Erie, Alliance and Wheeling Railroad and access to the coal fields located along that line.

Running rights were also acquired over the tracks of the Baltimore and Ohio Railroad Company between Ravenna and Haselton, Ohio, at which point connection is made with the Pittsburg and Lake Erie Railroad, thus opening up a new short route for traffic between the company's territory west of Cleveland, Ohio, and points on the Pittsburg and Lake Erie Railroad and also in the Mahoning and Shenango Valley district.

The company issued, on March 4, 1911, its one year notes payable March 4, 1912, to the extent of 60,000,000 francs, equivalent to \$11,538,461.53, and from the proceeds retired its one year franc notes falling due March 15, 1911, amounting to 44,000,000 francs. The balance remaining was applied to the general purposes of the company.

In accordance with an agreement dated April 13, 1911, between the Chicago, Milwaukee and St. Paul Railway Company, Chicago and North Western Railway Company, The Michigan Central Railroad Company and The Lake Shore and Michigan Southern Railway Company, the two latter companies sold in equal proportions to the Chicago, Milwaukee and St. Paul Railway Company and the Chicago and North Western Railway Company, forty per cent of their entire holdings in the capital stock and a like interest in certain other obligations of the Indiana Harbor Belt Railroad Company. The Lake Shore and Michigan Southern Railway Company, through this transaction, disposed of 4,900 shares of the capital stock and \$447,538.65 of promissory notes of the Indiana Harbor Belt Railroad Company. The Lake Shore and Michigan Southern Railway Company and The Michigan Central Railroad Company have guaranteed the principal and interest of an issue of \$6,725,000 of bonds of the Indiana Harbor Belt Railroad Company. To the extent of twenty per cent each the Chicago Milwaukee and St. Paul Railway Company and the Chicago and North Western Railway Company further agree to protect the guarantors of the Belt Company's bonds on their guaranty.

The company received during the year as reimbursement for advances made for construction purposes, 35,250 shares of preferred stock, par value \$3,525,000.00, and \$7,000,000.00 first mortgage bonds of The Cleveland Short Line Railway Company. For the same purpose it received 21,450 shares of stock, par value \$2,145,000.00, and \$2,150,000.00 first mortgage bonds of The Lake Erie and Pittsburg Railway Company.

There were acquired by purchase 42,000 shares of stock, par value \$2,100,000.00, of The Pittsburgh and Lake Erie Railroad Company, and \$25,000.00 of The Toledo and Ohio Central Railway Company, St. Mary's Division, first preference income bonds.

Under date of December 1, 1911, The Lake Shore and Michigan Southern Railway Company, together with The New York Central and Hudson River Railroad Company, The Michigan Central Railroad Company and The Cleveland Cincinnati Chicago and St. Louis Railway Company, became parties to an equipment trust agreement for the purpose of establishing the New York Central Lines Equipment Trust of 1912. Subsequently, the Chicago Indiana and Southern Railroad Company also became a party thereto. This agreement provides for an issue of \$15,000,000 of equipment trust certificates bearing interest at four and a half per cent per annum; being ninety per cent of the total cost of the equipment to be furnished under the terms of said agreement. The certificates are to be paid in fifteen annual installments of \$1,000,000 each; the first installment being payable January 1, 1913. The cost of the equipment to be assigned to this company will be approximately \$3,305,000, and the pro-rata amount of certificates representing ninety per cent of the cost will be approximately \$2,974,500. Full particulars as to the character of the equipment

to be acquired will be set forth in the report to the stockholders for 1912. Cost of road and equipment on December 31, 1910, was.... \$128,198,961.34 It has been increased during the year as follows:

Expenditures for additions and betterments to the property as shown in detail elsewhere .....	\$2,722,976.80	
Cost of equipment received during the year under the equipment trust of 1910.....	535,123.89	
Adjustment account transferring from "Physical property owned" the value of the warehouse, which was until February, 1911, leased to The Taylor Street Warehouse Company, now used by the company as an adjunct to its Chicago freight station .....	100,000.00	3,358,100.69
		\$131,557,062.03
Amount to credit of equipment replacement fund, December 31, 1910.....	\$986,824.51	
To which there was added value of equipment retired from service during the year.....	828,468.00	
	\$1,815,292.51	
Amount charged for new equipment acquired during the year consisting of 10 passenger, 40 freight and 25 switching locomotives, 15 steel mail cars, 1000 box cars, 12 caboose cars and miscellaneous work equipment.....	2,702,441.70	
Leaving expended for additional equipment in excess of the replacement fund .....		887,149.19
		\$132,444,211.22
Amount credited in 1911 for account of 1907 and 1910 equipment trust installments provided for through income.....		1,365,297.22
Cost of road and equipment, December 31, 1911.....		\$131,078,914.00

The following appointments were made during the year:  
 January 1, William A. Newman, General Freight Agent.  
 April 1, Sydney B. Wight, General Purchasing Agent and Frank V. Whiting, General Claims Attorney.  
 May 1, John W. Daly, Passenger Traffic Manager.  
 June 1, Albert S. Ingalls, General Superintendent.  
 Appreciative acknowledgment is made of the faithful, efficient performance of duty by employees in every department of the service during the year.

WILLIAM C. BROWN,  
President.

#### CONDENSED GENERAL BALANCE SHEET, DECEMBER 31, 1911.

Assets.	
Property investment .....	\$143,959,056.60
Working assets:	
Cash .....	\$12,063,012.85
Securities issued or assumed—held in treasury .....	3,900.00
Marketable securities .....	107,689,832.01
Loans and bills receivable .....	8,008,121.13
Traffic and car service balances due from other companies .....	1,060,734.89
Net balance due from agents and conductors .....	1,009,980.23
Miscellaneous accounts receivable .....	6,342,688.32
Materials and supplies .....	3,519,173.46
Other working assets .....	150,820.83
	139,848,263.72
Accrued income not due.....	1,530,246.46
Deferred debit items .....	2,215,673.53
Total assets .....	\$287,553,240.31
Liabilities.	
Stock .....	\$50,000,000.00
Mortgage, bonded and secured debt .....	168,172,482.57
Working liabilities .....	19,811,913.01
Accrued liabilities not due .....	4,407,072.60
Deferred credit items .....	161,825.73
Appropriated surplus .....	8,845,323.05
Profit and loss—balance .....	36,154,623.35
Total liabilities .....	\$287,553,240.31

#### TWENTY-THIRD ANNUAL REPORT, CLEVELAND, CINCINNATI, CHICAGO & ST. LOUIS RAILWAY COMPANY; FOR THE YEAR ENDED DECEMBER 31, 1911.

##### To the stockholders of

##### THE CLEVELAND, CINCINNATI, CHICAGO & ST. LOUIS RAILWAY COMPANY:

The Board of Directors herewith submits its report for the year ended December 31, 1911, with statements showing the results for the year and the financial condition of the company.

The mileage embraced in the operation of the road is as follows:

Main line .....	1,676.33
Branches .....	201.29
Trackage rights .....	134.02
Total length of road operated.....	2,011.64

There was a decrease in the main line mileage of 4.62 miles accounted for by changes in alignment, relocations and remeasurements. There was an increase in branch line mileage of 34.65 due to opening the Evansville branch and two miles of the Saline Valley Railway, with slight changes on account of remeasurements. A decrease of .60 miles in trackage rights is accounted for by the operation of the trains of this company into Toledo via Berwick, Ohio, instead of via Carey, Ohio, nearly offset by the addition of trackage rights at Evansville, over the Louisville and Nashville Railroad.

There was no change in the capital stock during the year, the amounts authorized and outstanding on December 31, 1911, being as follows:  
 Preferred stock authorized ..... \$10,000,000.00 || Common stock authorized ..... | 50,000,000.00 |

Total preferred and common stock authorized.....\$60,000,000.00  
 Preferred stock issued and outstanding.....\$10,000,000.00  
 Common stock issued and outstanding.....47,056,300.00

Balance common stock authorized but not issued, December 31, 1911 .....

\$2,943,700.00

The funded debt outstanding December 31, 1910, was.....\$86,792,000.97  
 It has been increased during the year as follows:

C C C & St L Ry general mortgage bonds; issued for additions, improvements, double tracking, equipment, etc. ....	\$1,000,000.00	
C C C & St L Ry 4½% twenty-year debenture bonds, dated January 1, 1911, maturing January 1, 1931, issued for purpose of funding floating indebtedness, and for construction and improvements .....	5,000,000.00	
C C C & St L Ry general mortgage bonds issued for retirement of prior lien bonds...	28,000.00	6,028,000.00
		\$92,820,000.97

Funded debt (brought forward).....	\$92,820,000.97
Retired during the year:	
Equipment trust certificates due January 1, 1911	\$199,625.82
Equipment trust certificates due November 1, 1911	246,689.81
C I St L & C Ry Co first mortgage bonds...	6,000.00
C I St L & C Ry Co general first mortgage bonds	22,000.00
C C C & St L Ry Co 5% Gold notes.....	4,988,000.00
Total funded debt outstanding December 31, 1911.....	\$87,357,685.34

Under date of December 1, 1911, The Cleveland, Cincinnati, Chicago and St. Louis Railway Company, together with The New York Central and Hudson River Railroad Company, The Lake Shore and Michigan Southern Railway Company and The Michigan Central Railroad Company, became parties to an equipment trust agreement for the purpose of establishing the New York Central Lines Equipment Trust of 1912. Subsequently, the Chicago, Indiana and Southern Railroad Company also became a party thereto. This agreement provides for an issue of \$15,000,000 of equipment trust certificates bearing interest at four and a half per cent per annum; being ninety per cent of the total cost of the equipment to be furnished under the terms of said agreement. The certificates are to be paid in fifteen annual installments of \$1,000,000 each; the first installment being payable January 1, 1913. The cost of the equipment to be assigned to this company will be approximately \$2,664,000 and the pro rata amount of certificates representing ninety per cent of the cost will be approximately \$2,398,320. Full particulars as to the character of the equipment to be acquired will be set forth in the report to the stockholders for 1912.

There was extended during the year for additions to the property, improvements, double tracking, equipment, etc., and charged to cost of road and equipment, the sum of \$3,690,080.24, a detailed statement of which will be found upon another page.

#### SUMMARY OF FINANCIAL OPERATIONS AFFECTING INCOME.

	1911.	1910	Increase or decrease.
OPERATING INCOME.	2,011.64	1,982.21	29.43
RAIL OPERATIONS.	miles operated.	miles operated.	miles operated.
Revenues	\$30,431,914.86	\$30,423,004.78	\$8,910.08
Expenses	22,239,392.18	23,495,620.12	-1,256,227.94
NET REVENUE FROM RAIL OPERATIONS	\$8,192,522.68	\$6,927,384.66	\$1,265,138.02
Percentage of expenses to revenue	(73.08%)	(77.23%)	—(4.15%)
OUTSIDE OPERATIONS.			
Revenues	\$355,626.95	\$335,702.20	\$19,924.75
Expenses	401,713.41	433,883.69	-32,170.28
NET DEFICIT FROM OUTSIDE OPERATIONS	\$46,086.46	\$98,181.49	—\$52,095.03
NET REVENUE FROM ALL OPERATIONS	\$8,146,436.22	\$6,829,203.17	\$1,317,233.05
TAXES ACCRUED	1,062,512.28	949,548.00	112,964.28
OPERATING INCOME	\$7,083,923.94	\$5,879,655.17	\$1,204,268.77
OTHER INCOME.			
Joint facilities rents	\$319,639.86	\$329,149.90	—\$9,510.04
Miscellaneous rents	207,988.31	203,603.48	4,384.83
Dividends on stocks owned or controlled	72,764.90	141,503.90	-68,739.00
Interest on funded debt owned	46,120.00	45,160.00	960.00
Interest on other securities, loans and accounts	52,769.25	91,689.56	-38,920.31
Miscellaneous income	8,448.94	9,706.68	-1,257.74
TOTAL OTHER INCOME.....	\$707,731.26	\$820,813.52	—\$113,082.26
GROSS CORPORATE INCOME...	\$7,791,655.20	\$6,700,468.69	\$1,091,186.51
DEDUCTIONS FROM GROSS CORPORATE INCOME.			
Rentals of leased lines.....	\$132,500.00	\$120,000.00	\$12,500.00
Hire of equipment, car mileage and per diem balances.	763,307.31	680,209.94	83,097.37
Interest on equipment trust certificates	271,722.40	213,875.94	57,846.46
Equipment reserve	446,315.63	446,315.63	—
Joint facilities rents	526,794.42	533,661.18	-6,866.76
Miscellaneous rents	141,710.61	142,868.82	-1,158.21
Interest on funded debt.....	3,475,625.15	3,187,574.66	288,050.49
Other interest	80,324.24	240,874.66	-160,550.42
Proportion loss operation Central Indiana Ry.	56,300.00	62,465.00	-6,165.00
Discount on debenture bonds.	53,425.00	43,441.29	9,983.71
Separately operated properties—loss	42,014.85	—	42,014.85
TOTAL DEDUCTIONS FROM GROSS CORPORATE INCOME	\$5,990,039.61	\$5,224,971.49	\$765,068.12
NET CORPORATE INCOME	\$1,801,615.59	\$1,475,497.20	\$326,118.39
Dividends, preferred, four, aggregating 5%.....	\$500,000.00	\$500,000.00	—
Dividends, common, one, 2%.....	—	941,126.00	—\$941,126.00
	\$500,000.00	\$1,441,126.00	—\$941,126.00
SURPLUS FOR THE YEAR....	\$1,301,615.59	\$34,371.20	\$1,267,244.39

NOTE: Decrease designated by minus sign, —.

Amount to credit of profit and loss (free surplus) December 31, 1910	\$2,192,735.68
Surplus for the year 1911	1,301,615.59
	\$3,494,351.27

Deduct:	
Discount on C. C. C. & St L Ry. Co. debenture bonds of 1910 and 1911.....	\$971,650.00
Discount on C. C. C. & St L Ry. Co. general mortgage bonds	94,010.00
Old Central Indiana Railway advances.....	153,756.70
Adjustment of sundry accounts.....	105,781.97
	1,325,198.67

BALANCE TO THE CREDIT OF PROFIT AND LOSS (FREE SURPLUS) DECEMBER 31, 1911	\$2,169,152.60
---	----------------

The total operating revenues for the year showed a slight increase of \$8,910.08 over the preceding year. For the most part, the detailed accounts show only minor variations from last year, the only important exceptions being decreases in express revenue of \$18,667.58; in switching revenue of \$26,821.84, and in special service train revenue of \$13,767.95, the latter on account of military encampment at Fort Benjamin Harrison in 1910; with increases in other passenger train revenue of \$30,192.18 and in miscellaneous revenue, other than transportation, of \$25,946.35.

Freight revenue for the year was \$19,933,295.87, an increase of \$10,395.30. The average revenue per ton mile showed but a slight variation from the preceding year, being 5.50 mills in 1911, as compared with 5.46 mills in 1910. The volume of freight moved was 23,339,590 tons, an increase of 409,958 tons over last year. The movement of individual commodities shows the largest increase in bituminous coal which was 818,807 tons in excess of last year; the most marked decreases were in coke, which decreased 234,376 tons, and in lumber, which decreased 181,199 tons. The average number of tons of revenue freight per train mile increased 14 tons and the average number of freight cars per train mile increased 3 cars.

Passenger revenue was \$7,819,254.70, an increase of \$7,242.59, which slight variation is altogether attributable to increase in the average revenue per passenger per mile from 1.795 cents to 1.825 cents, there being a decrease of 52,347 in the total number of revenue passengers carried and a decrease of 6,652,374 in revenue passengers carried one mile. Local revenue increased \$23,480.94 and interline revenue decreased \$16,238.35.

The decrease in express revenue of \$18,667.58 reflects decreased earnings of the express company on traffic over this road, the compensation fluctuating with the volume of business handled for the express company.

The operating expenses for the year amounted to \$22,239,392.18, a decrease of \$1,256,227.94. The fluctuations by groups were as follows:

Maintenance of way and structures—decrease....	\$563,804.77
Maintenance of equipment repairs—decrease.....	441,121.44
Maintenance of equipment renewals—increase.....	235,685.93
Traffic expenses—decrease.....	85,945.59
Transportation expenses—decrease.....	430,408.99
General expenses—increase.....	29,366.92
Net decrease	\$1,256,227.94

It will be noted that the foregoing shows in a marked degree a retrenchment of expenses wherever possible; as a result, the ratio of operating expenses to operating revenues was reduced from 77.23% to 73.08% (4.15%).

The decrease in maintenance of way and structures is distributed through practically all the accounts, the pay rolls of this department showing a decrease of \$278,844.43 from the preceding year. As exceptions to the general decrease, ties show an increase of \$42,934.52, due to the fact that track conditions necessitated the laying of 93,908 ties in excess of last year, and telegraph and telephone lines increased \$20,401.47, principally on account of installation of despatchers' telephone circuits on the Cleveland and Cincinnati divisions.

The decrease in maintenance of equipment repairs will be found to cover repairs of all classes of equipment, the pay rolls of this department showed a reduction of \$156,543.86 from the preceding year.

The increase in renewals of equipment, amounting to \$235,685.93, is principally accounted for by the retirement from service this year of 39 locomotives, costing \$282,927.91; only 8 being retired last year, costing \$38,922.97; there were also 8 passenger cars retired this year, costing \$26,353.15 as compared with 3 last year at a cost of \$14,327.67, retirements of equipment of other classes not materially varying from the preceding year.

Traffic expenses decreased \$85,945.59; the important items being outside agencies, decrease \$15,234.16, made possible by abolition or consolidation of agencies at various points; fast freight line expenses, decrease \$43,556.91, accounted for by the transfer of Merchants' Despatch Transportation Co. deficit in operations from this account to operation of outside properties, under deductions from income, and stationery and printing decreased \$30,944.70 on account of the abnormal necessities for tariffs in the preceding year.

Conducting transportation expenses decreased \$430,408.99. The decrease in pay rolls on account of decreased force in this department amounted to \$403,155.71, partially offset by increase in rates of pay during early part of the year, amounting to \$296,249.82. An important item of decrease in transportation expenses was in fuel for locomotives which showed a decrease of \$268,150.04, of which amount, approximately \$163,103.49 was due to decrease in average cost per ton from \$1.54 to \$1.45, and \$105,046.55 due to decreased consumption. Incident to the general policy of retrenchment, there was a reduction of 1,452,728 miles in revenue locomotive mileage for the year and a reduction of 978,594 miles in revenue train mileage. There was an increase of \$38,754.18 in payments made for personal injuries, on account of increased number of settlements due to casualties.

General expenses increased \$29,366.92, principally in the items of pensions, insurance, law expenses, and other expenses; the expenses of general administration being naturally enhanced by the exacting requirements of various state and federal commissions which require elaboration of details in reports and other general work for which no adequate provision could be made in former year.

The net deficit from outside operations decreased \$52,095.03. This is due to increased revenue from the dining car service, which was \$54,831.04 in excess of last year; the returns from other outside operations showing a net decrease of \$2,736.01 from last year.

Taxes have increased \$112,964.28; of which \$78,362.80 is due to increased taxes on intrastate earnings in Ohio and \$39,123.26 to increase of other taxes in Ohio, the balance being fluctuations in taxes in other states and in the federal income tax.

In other income a decrease is shown of \$113,082.26, which is on account of decreased dividends on securities owned in subsidiary companies, \$68,739.00, and decreased interest on bank balances, notes and loans.

The important items in increase in deductions from income, which amounted to \$765,068.12, are: increased interest on bonds, \$288,050.49, due to the issue during 1911 of \$5,000,000 twenty-year gold debenture bonds, maturing in 1931, and of \$1,000,000 additional general mortgage bonds; charges representing the 1911 proportion of installments on 1907 and 1910 equipment trust certificates \$446,315.63 against which there was no corre-

sponding charge in this account in 1910; increased interest on equipment trust certificates, \$57,846.46; increase in hire of equipment, \$83,097.37; and increase account of discount on debentures, \$9,983.71.

The surplus for the year, after paying a dividend of \$500,000 representing five per cent on the preferred stock, was \$1,301,615.59.

The general balance sheets and tabulated statements showing results of operation for the year are given later.

During the year the construction of the Evansville, Mt. Carmel and Northern Railway was completed and was opened for traffic on July 1, 1911, as the "Evansville branch" of this road. The line extends from Mt. Carmel, Illinois, to Evansville, Indiana; entrance into Evansville being secured by trackage rights over the Louisville & Nashville Railroad, with joint use of its terminal facilities at that point. The cost of construction of the road to December 31, 1911, was \$2,193,417.95, for which the Cleveland, Cincinnati, Chicago & St. Louis Railway Company has acquired all the capital stock of the road and \$2,082,000.00 of its funded debt. The outlook for business on this branch is very satisfactory.

There has been advanced during the year, for construction on the Saline Valley Railway, \$16,857.11, and two miles of this road are being operated, from Harrisburg to coal mines in the vicinity. The Saline Valley Railway Company, organized under the laws of the State of Illinois, April 6, 1907, will ultimately extend from Harrisburg, Saline County, Illinois, to this company's coal properties in the eastern part of Williamson County, Illinois, a distance of about 12 miles. The total expenditures for construction to date have been \$50,531.01. The Cleveland, Cincinnati, Chicago & St. Louis Railway Company owns all the capital stock and funded debt of this road.

There has been advanced on account of the St. Louis Short Line division for construction and improvements during the year, \$48,584.67.

This company's proportion of the deficit in operation of the Central Indiana Railway for the year 1911, amounting to \$56,300.00, has been charged off as a "Deduction from Income."

The sinking fund of the Cleveland, Cincinnati, Chicago & St. Louis Railway Company's St. Louis Division first collateral trust bonds has been increased during the year by the purchase of 24 bonds, par value \$24,000.00, making a total of 590 bonds, par value \$590,000.00, in the hands of the Central Trust Company, trustee of this fund.

The credit balance in equipment replacement fund on December 31, 1910 was.....

There was added during the year 1911 representing the value of equipment retired:.....

There was charged against this fund the following:

Locomotives ..... \$62,258.76

Passenger cars ..... 147,257.61

Freight cars ..... 52,678.45

Work cars ..... 114.74

Balance December 31, 1911 ..... \$974,130.83

Separate reports have been issued showing the financial condition and results from operation of the Peoria & Eastern Railway and the Cincinnati Northern Railroad for the year.

The operation of the Kankakee and Seneca Railroad (for which separate accounts are kept) shows earnings for the year \$73,661.21, operating ex-

penses and taxes \$94,680.23, additions and betterments, \$9.86, deficit, \$21,028.88.

The Mt. Gilead Short Line (for which separate accounts are kept) shows earnings for the year \$6,044.25, operating expenses and taxes \$9,124.37, deficit \$3,080.12.

The following appointments were made during the year:

On March 20, 1911, Sydney B. Wight, General Purchasing Agent.

On April 1, 1911, Frank V. Whiting, General Claims Attorney.

On May 1, 1911, John W. Daly, Passenger Traffic Manager.

On September 1, 1911, Herman M. Griggs and John B. Nettle, General Coal and Ore Agents.

On December 11, 1911, James C. Wallace, Auditor of Disbursements.

Appreciative acknowledgment is made of the faithful, efficient performance of duty by employees in every department of the service during the year.

WILLIAM C. BROWN,  
President.

#### CONDENSED GENERAL BALANCE SHEET, DECEMBER 31, 1911.

Assets.	
Property investment:	
Road and equipment .....	\$139,584,862.96
Securities owned .....	4,824,024.42
Other investments .....	2,543,810.11
Total .....	\$146,952,697.49
Working assets:	
Cash .....	\$2,789,131.46
Securities issued or assumed held in treasury	
Stock .....	29,100.00
Marketable securities	
Stock .....	122,851.00
Loans and bills receivable .....	323,899.15
Traffic and car service balances due from other companies .....	414,342.91
Net balance due from agents and conductors .....	721,687.95
Miscellaneous accounts receivable .....	2,458,973.59
Materials and supplies .....	1,724,178.73
Total .....	8,584,164.79
Deferred debit items .....	1,343,002.39
Total assets .....	\$156,879,864.67
Liabilities.	
Stock .....	\$57,496,014.46
Mortgage, bonded and secured debt .....	87,357,685.34
Working liabilities .....	7,839,540.61
Accrued liabilities not due .....	644,063.79
Deferred credit items .....	668,178.34
Appropriated surplus .....	705,229.53
Free surplus, profit and loss—balance .....	2,169,152.60
Total liabilities .....	\$156,879,864.67

#### SIXTY-SIXTH ANNUAL REPORT, MICHIGAN CENTRAL RAILROAD COMPANY; FOR THE YEAR ENDED DECEMBER 31, 1911.

To the Stockholders of

THE MICHIGAN CENTRAL RAILROAD COMPANY:

The Board of Directors herewith submits its report for the year ended December 31, 1911, with statements showing the results for the year and the financial condition of the company.

The report covers the operation of the following mileage:

	Miles.
Main line .....	270.07
Proprietary lines .....	343.31
Leased lines .....	1,110.20
Lines operated under trackage rights .....	93.18

Total road operated..... 1,816.76

The total road operated as shown in the report for 1910 was 1,803.29 miles. The increase of 13.47 miles shown for this year is on account of corrections due to re-measurement.

There was no change in capital stock during the year, the amount authorized and outstanding being \$18,738,000.00.

The funded debt outstanding December 31, 1910, was..... \$41,870,578.68

It has been decreased during the year ended

December 31, 1911, as follows:

Installment on New York Central lines equipment trust certificates of 1910, paid January 1, 1911 .....

Installment on New York Central lines equipment trust certificates of 1907, paid November 1, 1911 .....

Michigan Central-Jackson, Lansing & Saginaw three and one-half per cent. gold bonds of 1951 purchased and cancelled by the Trustees of the Land Grant Fund of the Jackson, Lansing & Saginaw Railroad Company .....

Total funded debt December 31, 1911 (detail on another page) .....

The total amount charged to road and equipment on December 31, 1911, was \$65,527,985.12 as follows:

Amount charged against main line to December 31, 1910..

There was charged for additions and betterments in 1911, as shown in detail on another page

Against capital account

For road .....

For equipment .....

Against income account (appropriated surplus)

For equipment .....

Less: Equipment replacement fund .....

Equipment trust installments .....

Total main line .....

Amount charged account leased lines to December 31, 1910 .....

There was charged for additions and betterments in 1911 against capital account for road, as shown in detail elsewhere .....

Total leased lines .....

Grand total .....

The double tube tunnel under the Detroit River, including interlocking system, electrical sub-stations and equipment, was fully completed in the early part of the year, and in its operation has met every expectation. The earnings of the Detroit River Tunnel Company for the year were sufficient to defray maintenance and operating expenses, taxes, interest on bonds, and to pay a dividend of two per cent. on its capital stock, with a surplus of \$159,152.33. Under date of May 10, 1911, an agreement, supplemental to the lease of December 19, 1906, was made with the Detroit River Tunnel Company, whereby that company is now proceeding with the construction of a passenger station, terminal yards, and accommodations, in the City of Detroit, which facilities, when completed, will be operated by The Michigan Central Railroad Company. This company has agreed to guarantee the principal and interest on thirty million dollars of Detroit River Tunnel Company Terminal and Tunnel Gold Bonds, bearing date May 1, 1911, as issued. There were issued and sold during the year fourteen millions of such bonds, bearing interest at the rate of 4½% per annum.

In accordance with an agreement dated April 13, 1911, between the Chicago Milwaukee and St. Paul Railway Company, Chicago and North Western Railway Company, The Michigan Central Railroad Company and The Lake Shore and Michigan Southern Railway Company, the two latter companies sold in equal proportions to the Chicago Milwaukee and St. Paul Railway Company and the Chicago and North Western Railway Company, forty per cent. of their entire holdings in the capital stock and a like interest in certain other obligations of the Indiana Harbor Belt Railroad Company. The Michigan Central Railroad Company, through this transaction disposed of 4,900 shares of the capital stock and \$447,538.65 of promissory notes of the Indiana Harbor Belt Railroad Company. The Lake Shore and Michigan Southern Railway Company and The Michigan Central Railroad Company have guaranteed the principal and interest of an issue of \$6,725,000.00 of bonds of the Indiana Harbor Belt Railroad Company. To the extent of twenty per cent. each the Chicago Milwaukee and St. Paul Railway Company and the Chicago and North Western Railway Company further agree to protect the guarantors of the Belt Company's bonds on their guaranty.

Under date of December 1, 1911, The Michigan Central Railroad Company, together with The New York Central and Hudson River Railroad Company, The Lake Shore and Michigan Southern Railway Company and The Cleveland Cincinnati Chicago and St. Louis Railway Company, became parties to an equipment trust agreement for the purpose of establishing the New York Central Lines Equipment Trust of 1912. Subsequently, the Chicago Indiana and Southern Railroad Company also became a party thereto. This agreement provides for an issue of \$15,000,000 of equipment trust certificates bearing interest at four and a half per cent. per annum; being ninety per cent. of the total cost of the equipment to be furnished under the terms of said agreement. The certificates are to be paid in fifteen annual installments of \$1,000,000 each; the first installment being payable January 1, 1913. The cost of the equipment to be assigned to this company will be approximately \$2,528,000 and the pro rata amount of certificates

representing ninety per cent. of the cost will be approximately \$2,275,200. Full particulars as to the character of the equipment to be acquired will be set forth in the report to the stockholders for 1912.

#### SUMMARY OF FINANCIAL OPERATIONS AFFECTING INCOME.

	1911. 1,816.76 miles operated.	1910. 1,803.29 miles operated.	Increase or decrease. 13.47 miles operated.
OPERATING INCOME.			
RAIL OPERATIONS.			
Revenues .....	\$30,164,490.16	\$29,694,815.71	\$469,674.45
Expenses .....	20,746,231.18	21,628,906.26	-882,675.08
NET REVENUE FROM RAIL OPERATIONS .....	\$9,418,258.98	\$8,065,909.45	\$1,352,349.53
Percentage of expenses to revenue .....	(68.78%)	(72.84%)	—(4.06%)
OUTSIDE OPERATIONS.			
Revenues .....	\$608,294.24	\$543,636.69	\$64,657.55
Expenses .....	599,385.38	599,951.82	-566.44
NET REVENUE FROM OUTSIDE OPERATIONS .....	\$8,908.86	.....	\$65,223.99
NET DEFICIT FROM OUTSIDE OPERATIONS .....	.....	\$56,315.13	.....
NET REVENUE FROM ALL OPERATIONS .....	\$9,427,167.84	\$8,009,594.32	\$1,417,573.52
TAXES ACCRUED .....	1,322,620.82	1,357,019.92	-34,399.10
OPERATING INCOME .....	\$8,104,547.02	\$6,652,574.40	\$1,451,972.62
OTHER INCOME.			
Joint facilities rents .....	\$236,403.38	\$229,289.51	\$7,113.87
Miscellaneous rents .....	3,259.77	2,676.02	583.75
Dividends on stocks owned or controlled .....	347,241.50	287,241.50	60,000.00
Interest on funded debt owned .....	46,880.00	46,880.00	.....
Interest on other securities, loans and accounts .....	525,154.01	440,969.02	84,184.99
Miscellaneous income .....	12,018.43	86,623.87	-74,605.44
TOTAL OTHER INCOME .....	\$1,170,957.09	\$1,093,679.92	\$77,277.17
GROSS CORPORATE INCOME .....	\$9,275,504.11	\$7,746,254.32	\$1,529,249.79
DEDUCTIONS FROM GROSS CORPORATE INCOME.			
Rentals of leased lines .....	\$1,605,443.67	\$585,310.00	\$1,020,133.67
Equipment reserve .....	599,523.67	.....	599,523.67
Hire of equipment .....	652,736.44	1,073,983.18	-421,246.74
Interest on equipment trust certificates .....	367,716.93	261,523.83	106,192.94
Joint facilities rents .....	583,551.98	620,568.83	-37,016.85
Miscellaneous rents .....	6,816.35	6,069.24	747.11
Interest on funded debt .....	2,543,998.88	2,535,398.33	8,600.55
Other interest .....	624,464.64	746,367.95	-121,903.31
Other deductions .....	174,887.13	199,701.96	-24,814.83
TOTAL DEDUCTIONS FROM GROSS CORPORATE INCOME .....	\$7,159,139.69	\$6,028,923.48	\$1,130,216.21
NET CORPORATE INCOME .....	\$2,116,364.42	\$1,717,330.84	\$399,033.58
DIVIDENDS, TWO, AGGREGATING 6% .....	1,124,280.00	1,124,280.00	.....
SURPLUS .....	\$992,084.42	\$593,050.84	\$399,033.58
Additional equipment			
On account 1910 proportion of New York Central Lines 1907 and 1910 equipment trusts .....	.....	\$250,000.00	—\$250,000.00
BALANCE TO PROFIT AND LOSS.	\$992,084.42	\$343,050.84	\$649,033.58

NOTE: Decrease designated by minus sign, —.

AMOUNT TO CREDIT OF PROFIT AND LOSS (FREE SURPLUS) DECEMBER 31, 1910 .....	\$9,051,952.11
BALANCE TO PROFIT AND LOSS FOR YEAR 1911 .....	992,084.42
	\$10,044,036.53

ADD:	
To increase ledger value Indiana Harbor Belt Railroad Company's stock to par .....	\$1,224,998.00
From C & N W Ry and C M & St P Ry account proportion I H B deficit to December 31, 1910 .....	122,961.09
Proceeds sale of Toledo property .....	21,079.54
Adjustment sundry items .....	54,375.57
	1,423,414.20
	\$11,467,450.73

DEDUCT:	
For abandoned property .....	\$105,054.42
Balance 10% payments account trust equipment of 1910 .....	83,356.70
Exchange on French notes .....	50,980.12
	239,391.24
BALANCE TO CREDIT OF PROFIT AND LOSS (FREE SURPLUS) DECEMBER 31, 1911 .....	\$11,228,059.49

The total operating revenues were \$30,164,490.16, an increase of \$469,674.45 as compared with the previous year.

The freight revenue was \$19,538,684.00, an increase of \$256,395.55. This was due to the increased movement of flour, dressed meats, coke, stone and miscellaneous commodities.

The passenger revenue was \$7,607,051.96, an increase of \$202,576.30 due to increased train service and general improvement in excursion travel and local business.

The express revenue was \$1,478,449.15, a decrease of \$41,500.52 compared with the previous year.

The revenue from the transportation of mails was \$411,700.55, a de-

crease of \$19,924.77. This is an apparent decrease only, due to the fact that mail revenues for 1910 were over estimated in advance of actual figures not received until too late to revise the 1910 statements.

The operating revenue from all other sources increased \$72,127.89 over the previous year.

The total expenses of operation were \$20,746,231.18, a decrease of \$882,675.08, as per detail on following pages. By groups and principal fluctuations they were as follows:

Maintenance of way and structures \$3,549,204.67, a decrease of \$486,056.11, caused principally by reduction in outlay for stone ballasting, fencing, crossing gates, etc., fewer bridges and buildings needing replacement, less snow and ice to contend with, and a considerable reduction in force.

Maintenance of equipment \$3,800,772.34, a decrease of \$323,593.26, principally caused by reduced charges for repairs.

Traffic expenses \$783,599.14, a decrease of \$98,551.94, principally due to decreased charges account of fast freight lines through a different method of treating deficit account Merchants' Despatch Transportation Company and large reduction in cost of tariffs included in stationery and printing.

Transportation expenses \$12,049,103.34, an increase of \$25,514.19 notwithstanding the discontinuance of operation of the Detroit River ferry boats, and is largely due to increased train mileage, cost of fuel and increased pay of train and engine crews.

General expenses \$563,551.69, an increase of \$12.04.

There was an increase in the revenue from outside operations of \$65,223.99 over the previous year derived principally from dining car service and operation of stock yards and restaurants.

The operating income was \$8,104,547.02, an increase of \$1,451,972.62.

Other income was \$1,170,957.09, an increase of \$77,277.17, of which \$60,000.00 was due to additional amounts received from interest and dividends on securities, \$84,184.99 to additional interest on notes, loans, etc. and \$7,697.62 to rentals partially offset by a decrease of \$73,363.61 in profit on trust equipment material.

Deductions from income amounted to \$7,159,139.69, an increase of \$1,130,216.21. The principal fluctuations were an increase of \$1,001,383.67 due to rental of the Detroit River Tunnel, an increase of \$599,523.67 due to a charge against income of an amount equivalent to the installments on account of the 1907 and 1910 equipment trusts, an increase of \$106,192.94 in interest on equipment trust certificates, a decrease of \$421,246.74 in hire of equipment and a decrease of \$121,903.31 in general interest.

The profit from operation for the year, after payment of six per cent in dividends upon the capital stock was \$992,034.42, which has been carried to the credit of profit and loss.

The credits to retired equipment account during the year amounted to ..... \$407,093.00

The charges against this account for cost of new equipment and betterments were as follows:

10 locomotives .....	\$209,628.40
8 steel postal cars .....	93,295.83
3 cafe coaches .....	23,455.60
1/2 interest in joint equipment consisting of 1 first class coach and 2 smoking and baggage cars .....	7,870.91
19 caboose cars .....	18,107.60
Miscellaneous charges covering United States duty on six Canada Southern engines and application of sundry betterments to equipment .....	22,540.30
	374,898.64

Credit balance December 31, 1911 ..... \$32,194.36

The following appointments of officials were made during the year:  
January 1, Louis W. Landman, General Passenger Agent, succeeding Oliver W. Ruggles, transferred.  
March 20, Sydney B. Wight, General Purchasing Agent.  
April 1, Frank V. Whiting, General Claims Attorney, New York.  
May 1, John W. Daly, Passenger Traffic Manager, succeeding Warren J. Lynch resigned.  
September 1, Herman M. Griggs, and John B. Nettle were appointed General Coal and Ore Agents.  
Appreciative acknowledgment is made of the faithful, efficient performance of duty by employees in every department of the service during the year.

WILLIAM C. BROWN,  
President.

#### CONDENSED GENERAL BALANCE SHEET, DECEMBER 31, 1911.

<b>Assets.</b>	
Property investment, road and equipment .....	\$65,527,985.12
Securities .....	7,039,192.50
Other investments .....	2,920,876.13
Total property owned as investment .....	\$75,488,053.75
Working assets:	
Cash .....	\$3,311,257.02
Michigan Central Railroad stock .....	1,600.00
Marketable securities .....	18,130.28
Net traffic, car mileage and per diem balance .....	184,110.97
Net balance due from agents and conductors .....	1,818,608.98
Miscellaneous accounts receivable .....	1,331,555.16
Materials and supplies .....	2,531,254.35
	9,196,516.76
Accrued income not due .....	258,618.65
Deferred debit items .....	1,246,181.39
Total assets .....	\$86,189,370.55
<b>Liabilities.</b>	
Stock .....	\$18,738,000.00
Mortgaged, bonded and secured debt .....	41,269,055.01
Total capitalization .....	\$60,007,055.01
Working liabilities .....	9,006,395.30
Accrued liabilities not due .....	1,096,349.36
Deferred credit items .....	1,095,388.25
Appropriated surplus .....	3,756,123.14
Free surplus, profit and loss—balance .....	11,228,059.49
Total liabilities .....	\$86,189,370.55